HS301 – Fundamentals of Biostatistics
Spring 2017

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A. Course description

Fundamentals of Biostatistics (3 credits).
This is an introductory course in statistical methods used in applied research for the biological sciences. The course will emphasize the principles of statistical reasoning, underlying assumptions, hypothesis testing, and careful interpretation of results. Some topics covered include descriptive statistics, graphical displays of data, probability, confidence intervals and tests for means, differences of means, sample size and power, differences of proportions, chi-square tests for categorical variables, regression, multiple regression, and non-parametric statistics.
Prerequisite: Math 100, HS105

B. Format

Hybrid course (online content with class discussions and computer lab assignments)

C. Textbook

Basic Biostatistics by B. Bert Gerstman (Jones and Bartlet Publishers, 2008) or Basic Biostatistics by B. Bert Gerstman (Second edition)

D. General goals and objectives

Students will develop a new set of reasoning skills that will provide a foundation for designing, analyzing and interpreting research in the biological sciences. This knowledge and skills are essential in today's healthcare environment which emphasizes evidenced-based healthcare and health outcome evaluation.
At the conclusion of this course students will able to:

- Appreciate the vital role of biostatistics in healthcare research and in promoting evidenced-based healthcare and health outcome evaluation.
- Articulate the underlying concepts and assumptions for major study designs, hypothesis testing and common analytical methods.
- Demonstrate quantitative skills such as the ability to organize raw data, graphically explore the data distributions, conduct appropriate statistical analyses and interpret and apply results for problem solving.

E. Grading system

93 – 100	A	77 – 79	C+
90 – 92	A-	73 – 76	C
87 – 89	B+	70 – 72	C-
83 – 86	B	67 – 69	D+
80 – 82	B-	60 – 66	D
		Below 60	F

"A" reflects exceptional work (going beyond the basics, integrating material well, displaying professionalism in individual and group work, application and demonstration of knowledge and skills, showing initiative, using creativity, writing is reflective of multiple drafts).

"B" reflects good work (valuable teamwork skills, active in class, ability to grasp basic concepts and apply to new situations, some participation in class, completes all assignments with a degree of proficiency but may not demonstrate initiative, creativity or reflection consistently, writing contains errors or lacks conciseness and completeness).

"C" reflects average work (assignments are completed at the minimum, basic concepts are grasped but cannot be applied, some difficulty in group work, spelling and grammar mistakes are common, writing is conversational in tone with little attention paid to detail, word choices, organization (rough draft quality), little participation in class.

Student responsibilities for successful coursework:

Attendance: Students should plan to attend all classes and are responsible for all information presented in class. Notify the instructor in person, by telephone or email if an absence is anticipated. Class begins promptly at the scheduled times.

Reading Assignments: Additional readings will be posted in D2L. Students will be more successful in the class if the text and other handouts are read before the class period during which a given topic will be covered. The course is focused on discussion and analysis of topics. Readings will prepare you for participation in class.

Written work must be computer-printed (12 point font, double-spaced, 1 inch margins) and written in complete sentences with proper punctuation, spelling and grammar. Student names should be printed in the upper right hand corner of the paper. All assignments are due at class time on the day specified. Students must submit one copy of their homework in the drop box of D2L before class and also bring a copy for review in class. Late assignments may be accepted but these will receive a lower grade. *If you have any concern about meeting the requirements of this course, please see me.*

G. Derivation of course grade

Two exams (20% each - multiple choice and short answer)	40%
Lesson Quizzes	15%
Activities (D2L drop box)	15%
Final exam (comprehensive)	30%

H. Other class information

Cell phone policy - please don't use your cell phone during class! No text messaging.
Email – please note that you are responsible for anything I send you via email.
Remember, class attendance is very important!

I. Communicating with your instructor via email

I check my email frequently during the day. However, I receive a lot of email and I sometimes delete emails which do not have the subject specified. If you have not received a response to your email within 24 hours, please resend your email. I do not check email routinely on some weekends.

J. Students with special needs

Students with special needs should contact the instructor as early in the semester as possible to make any necessary class/test accommodations.

The contents of this syllabus are as complete and accurate as possible. The instructor reserves the right to make any changes necessary to the syllabus and course material. The instructor will make every effort to inform the students of changes as they occur. It is the responsibility of the student to know what changes have been made in order to successfully complete the requirements of the course. Any in-class announcement, verbal or written, is considered official addendum to this syllabus.

Week	***Background Reading & Lessons***	***Activities***
#1 *Jan 23*	• *Introduction and course overview*	
#2 *Jan 30*	• *Lesson 1a – Introduction to Statistics and (healthcare informatics)* • *Lesson 1b - Intro to Chance and Probability*	• *Deming videos* • *Hans Rosling – The Joy of Stats video (1 hour)* • *Lesson 1a Quiz* • *Lesson 1b Quiz*
#3 *Feb 6*	• *Read Chapter 1 Text* • *Lesson 2 – Measurement* • *Read Chapter 2 Text* • *Lesson 3 – Major Study Designs*	• *Lesson 2 Quiz* • *Lesson 3 Quiz*
#4 *Feb 13*	• *Lesson 4 – Sampling* • *Chalk talk - Sampling* • *Read Chapter 3 Text* • *Lesson 5 – Frequency Distributions*	• *Lesson 4 Quiz* • *Lesson 5 Quiz*
#5 *Feb 20*	• *Read Chapter 4 Text* • *Lesson 6 – Summary Statistics* • *Read Chapter 5 Text* • *Chalk talk – Variance part* • *Lesson 7 – Probability Concepts*	• *Lesson 6 Quiz* • *Minitab activity 1 – Frequency and Descriptive Statistics* • *Lesson 7 Quiz*
#6 *Feb 27*	• *Read Chapter 6 Text* • *Lesson 8 – Binomial Probability Distributions* • *Read Chapter 7 Text* • *Lesson 9- Normal Probability Distributions*	• *Lesson 8 Quiz* • *Minitab activity 1 answers due on D2L* • *Lesson 9 Quiz*
#7 *Mar 6*	• *Read Chapter 8 Text* • *Lesson 10 – Introduction to Statistical Inference* • *Chalk talk – Central Limit Theorem* • *Read Chapter 9 Text* • *Lesson 11- The Basics of Hypothesis Testing* • *Chalk talk – Hypothesis Testing* • *Chalk talk – Sample Size and Power* • *Read Chapter 10 Text* • *Lesson 12- Confidence Intervals*	• *Lesson 10 Quiz* • *Lesson 11 Quiz* • *Lesson 12 Quiz*
#8 *Mar 13*	• *Review for Exam 1* • ***Exam 1***	• *Exam 1*
Mar 20	***Spring Break***	
#9 *Mar 27*	• *Read Chapter 11 Text* • *Lesson 13- Inferences about a Mean*	• *Lesson 13 Quiz*
#10 *Apr 3*	• *Read Chapter 12 Text* • *Lesson 14- Comparing Independent Means* • *Chalk talk – T-Tests* • *Read Chapter 13 Text* • *Lesson 15 - Comparing Several Means* • *Chalk talk – ANOVA*	• *Lesson 14 Quiz* • *Minitab activity 2– t-tests* • *Lesson 15 Quiz* • *Minitab activity 3– ANOVA*

#11 *Apr 10*	• *Read Chapter 14 Text* • *Lesson 16 - Correlation and Regression* • *Chalk talk – Correlation* • *Chalk talk – Regression* • *Read Chapter 15* • *Lesson 17 –Multiple Linear Regression*	• *Minitab activity 2 answers due on D2L* • *Lesson 16 Quiz* • *Lesson 17 Quiz* • *Minitab activity 4 - Correlation and Regression*
#12 *Apr 17*	• *Review for exam 2* • ***Exam 2** – Intro concepts plus Chapters 10-15*	• *Minitab activity 3 answers due on D2L* • *Minitab activity 4 answers due on D2L*
#14 *Apr 24*	• *Read Chapter 16* • *Lesson 18 - Inference about a Proportion* • *Read Chapter 18 and Chapter 19* • *Lesson 19 – Chi-sq test* • *Chalk talk – Chi-sq*	• *Lesson 18 Quiz* • *Minitab activity 5– Chi-sq analysis* • *Lesson 19 Quiz*
#15 *May 1*	• *Lesson 20 - Introduction to Nonparametric Statistics* • *Chalk talk – Non-Parametric Statistics* • *Lesson 21 - A Brief Introduction to Advanced Statistics* *Chalk talk – Some Advanced Statistics*	• *Minitab activity 5 answers due on D2L* • *Lesson 20 Quiz* • *Lesson 21 Quiz*
#16 *May 8*	• *Review for the Final Exam*	
May 15 (Monday)	• *Final exam 10:15-12:15*	