Introductory Biostatistics (STAT 109: #42050)

Text:	*Introductory Statistics*, free textbook from OpenStax, https://openstax.org/details/books/introductory-statistics
Class notes:	Posted on CANVAS. This notes has all of the class stuff that will be covered. ♣ *required*
Class:	9:00-9:50AM, MWF (Lecture) FH 025 (CRN# 42051) Lab 9:00~10:50PM (Thu) (LAB) BSS#317 (CRN# 42599) Lab 11:00~12:50PM (Thu) (LAB) BSS#317
Professor:	Dr. Yoon G. Kim, Department of Mathematics
Office:	BSS 348 826-5399, (fax)826-3140, *<ygk1@humboldt.edu>* https://sites.google.com/humboldt.edu/yoongkim
Office hours:	11~11:50 MTWF or by appointment Use e-mail to send me any questions, and I reply promptly.
Objectives:	This course is designed to help students understand probability and statistical concepts and modern statistical data analysis methods using **R**. You will be learning (i) basic concepts on statistical graphs, probability, distributions, and testing methods, (ii) application of modern statistical methods in a real world problem. In short, you *learn how to speak in terms of probability, how to analyze data, and what they mean using **R***. You will be using the R statistical software package.
Grading:	

Quiz (weekly)	25% of Final Grade
HW (weekly)	30% of Final Grade
Two midterm & Final	45% of Final Grade

(a) You are strongly encouraged to attend regularly. If you miss a class or a lab *you are responsible* for finding out what you missed. "***I wasn't there last time***" is never an acceptable excuse.

(b) All assignments, which are not turned in on time, will receive a grade of zero. Any tests taken at different time will be always ***more difficult*** than the regular test.

Class Calendar:

	Monday	Wednesday	Lab (Thursday)	Friday
Week 1	8/25/25	8/27/25	8/28/25	8/29/25 **HW#1**
Week 2	*Labor Day*	9/03/25	9/04/25	9/05/25 **HW#2**
Week 3	9/08/25	9/10/25	9/11/25	9/12/25 **HW#3**
Week 4	9/15/25	9/17/25	9/18/25	9/19/25 **HW#4**
Week 5	9/22/25	9/24/25	9/25/25	9/26/25 **HW#5**
Week 6	9/29/25 ***Test #1***	10/01/25	10/02/25	10/03/25 **HW#6**
Week 7	10/06/25	10/08/25	10/09/25	10/10/25 **HW#7**
Week 8	10/13/25	10/15/25	10/16/25	10/17/25 **HW#8**
Week 9	10/20/25	10/22/25	10/23/25	10/24/25 **HW#9**
Week 10	10/27/25	10/29/25	10/30/25	10/31/25 **HW#10**
Week 11	11/03/25 ***Test #2***	11/05/25	11/06/25	11/07/25 **HW#11**
Week 12	11/10/25	11/12/25	11/13/25	11/14/25 **HW#12**
Week 13	11/17/25	11/19/25	11/20/25	11/21/25 **HW#13**
	THANKSGIVING	*BREAK*		
Week 14	12/01/25	12/03/25	12/04/25	12/05/25 **HW#14**
Week 15	12/08/25	12/10/25	12/11/25	12/12/25 **HW#15**

		FINAL		

* This course fulfills *Lower Division General Education Area B:* Mathematical Concepts & Quantitative Reasoning

General education in the natural sciences and mathematics focuses on the physical universe and its life forms. This requirement helps students cope with, and participate in, the changing world. Recognizing the importance of scientific methods as investigative tools, the courses present science as a unified discipline with a major impact on the human condition. GE science courses:

- provide an understanding of the nature, scope, and limits of science and its relation to other branches of human inquiry;
- teach the language of science to facilitate cognition, interpretation, and communication;
- develop scientific reasoning for use in the critical examination of information;
- identify sources of information for the pursuit of scientific inquiry;
- impart the facts and principles which form our understanding of the living and nonliving systems of our universe;
- provide direct participation in a laboratory experience;
- develop mathematical concepts and quantitative reasoning and demonstrate their widespread applications in problem solving;
- promote an understanding of the impact of scientific knowledge and technology on our civilization both past and present and recognize the contributions made by men and women; &
- consider the moral & ethical implications of science so as to nurture a respect for human values.

Upon completing this requirement students will be able to:

- use skills beyond the level of intermediate algebra to solve problems through quantitative reasoning
- apply mathematical concepts and quantitative reasoning to problems

Special Notes

Students with Disabilities: Persons who wish to request disability-related accommodations should contact the Student Disability Resource Center in House 71, 826-4678 (voice) or 826-5392 (TDD). Some accommodations may take up to several weeks to arrange. See http://disability.humboldt.edu/ for additional information.

GE course learning outcome: Visit https://academicprograms.humboldt.edu/node/33.

Add/Drop policy: _____, 2025 is the deadline to Add or Drop classes without a serious and compelling reason for the Fall 2025 semester.

Emergency evacuation: Please review the evacuation plan for the classroom (posted on the orange signs), and review https://risksafety.humboldt.edu/campus-emergency-preparedness for information on campus emergency procedures. During an emergency, information can be found on campus conditions at http://risksafety.humboldt.edu/campus-emergency-preparedness-0.

Academic honesty: Students are responsible for knowing policy regarding academic honesty. See https://studentrights.humboldt.edu/academic-honesty for information.

Attendance and disruptive behavior: Students are responsible for knowing policy regarding attendance and disruptive behavior. See https://studentrights.humboldt.edu/attendance-behavior for information.

STAT 109 Syllabus

Chapter 1. Introduction

- Intro to Sample vs. Population: concepts about statistics vs. population parameters
- Intro to Various Sampling methods: simple random sampling, stratified r.s., systematic r.s., cluster r.s.
- Intro to Observational studies vs. Randomized Controlled Experiments

Chapter 2. Description of Data

- Variables, Types of Data, and Best Way to Summarize Them
- Descriptive and Inferential Statistics
- Measure of Center: Mean, Median, Mode, Weighted Mean + Q1, Q3
- Measure of Dispersion: Range, Variance, Standard Deviation + IQR
- Empirical Rule (i.e., 68-95 rule) & Chebyshev's Rule
- Various Plots: Histograms, Pie Chart, Stem & Leaf Plot, Boxplot, Outliers

Chapter 3. Probability and the Binomial Distribution

- Sample Space, Probability, Conditional Prob, Bayes' Rule, Counting Rules
- Addition Rule, Multiplication Rule, Mutually Exclusive Events, Independent Events
- Mean, Expected Value, Variance & SD from Prob. Distribution Table
- The Binomial R.V., Distribution, Prob Calculation and Properties

Chapter 4. The Normal Distribution

- The Normal Distribution and its Properties
- Standard Score, Percentiles, Quantiles and The Standard Normal Table
- The Normal Probability Plot & Interpretation

Chapter 5. Sampling Distributions

- The Central Limit Theorem & Its Use
- The Normal Approximation to the Binomial Distribution

Chapter 6. Confidence Intervals and Sample Size

- The t Distribution & Its Relationship with the Z Dist
- Confidence Intervals for the Mean (when σ is known vs. unknown)
- Confidence Intervals for the Proportion
- The χ^2 Distribution, Confidence Intervals for the Variance

Chapter 7. Hypothesis Testing

- Four Steps in Statistical Hypothesis Testing
- H_0 vs. H_1
- P-value, Interpretation and the Decision Rule (i.e., Rejection Region)
- Hypothesis Testing for the Mean (when σ is known vs. unknown)
- 1-tailed test vs. 2-tailed test
- Hypothesis Testing for the Variance

Chapter 8. Hypothesis Testing for the Two Sample Cases

- Hypothesis Testing for the Difference Between Two Sample Means (when σ's are known vs. unknown)
- Two Independent Samples vs. Paired Samples
- Hypothesis Testing for the Difference Between Two Sample Variances
- Hypothesis Testing for the Difference Between Two Sample Proportions

Chapter 9 & 10. Contingency Tables

- Test for Goodness of Fit, Calculation of the χ^2 Test Statistic, Drawing a Conclusion
- Test for Independence, Calculation of the χ^2 Test Statistic, Drawing a Conclusion

Chapter 11. Analysis of Variance

- 1-Way Analysis of Variance, Meaning, Necessary Assumptions, Calculation, Drawing a Conclusion
- Various Multiple Comparison Methods, Meaning, Necessary Assumptions, Calculation, Drawing a Conclusion
- Brief Intro to 2-Way Analysis of Variance

Chapter 12. Correlation and Simple Linear Regression

- Scatter Plots, Basic Calculations of Correlation, Regression Line
- The Least Squares Regression Line, Principle, Results
- Coefficient of Determination and Standard Error of the Estimates
- Inferences for Estimates (i.e., Intercept & Slope)
- Brief Intro to Multiple Linear Regression