

Ministry of Higher Education and Scientific research



Department of Statistics

College of administration and Economics

University of Salahaddin-Hawler

Subject: BioStatistics

Course Book – 2nd Year (1st semester)

Lecturer's name: Hazhar Talaat Abubaker Blbas (Ph.D.)

Huner Adam Hamza (MSc)

Academic Year: 2024-2025

Course Book

1. Course name	Bio-Statistics
2. Lecturer in charge	Hazhar T. A. Blbas Huner Adam Hamza
3. Department/ College	Statistics and informatics/Administration and Economics
4. Contact	e-mail: Hazhar.abubaker@su.edu.krd
5. Time (in hours) per week	Theory: 3 Practical: N/A
6. Office hours	Tuesday: 12:30-2:30 & Thursday:8:30-10:30
7. Course code	
8. Teacher's academic profile	<p>Hazhar Blbas is a lecturer in Statistics Department in College of Administration and Economics at Salahaddin University Erbil. He gained his bachelor degree in Statistics Department at Salahaddin University and he was the third student among 132 students with average 85.516 in 2007. He has taught several classes as assistantship in this department during four years. He gained master degree scholarship in Applied Statistics at University of Central Florida in the United States of America with GPA 3.425 out of 4 on May 2014. After finishing his master degree, he came back to home to serve his country as much as he could and he has been working in several universities such as Salahaddin University, Tishk International University, Knowledge University, and Cihan University and he has taught several classes such as Principle of Statistics, Applied Statistics, Sampling, Survey, Regression Models, SPSS, and Academic Debate. He gained a Ph.D. in</p>

	<p>Applied Statistics at Salahaddin University on October 2022.</p> <p>He is a founder of STAT Office / Organization for Statistical Data Analysis and Training, in this center they will help all undergraduate and graduate students in writing their thesis or dissertation especially in practical section. In STAT Office, he has worked with several master and PhD students as external supervisor. Hazhar Blbas also has supervised several final projects of Bachelor in his main filed.</p> <p>Hazhar Blbas has published 27 papers, 8 of them in Scopus and 7 of them in Thomson Reuters and he has 221 citations from now. Also he has written one academic book entitled Elementary of Statistics by English Language which is helpful for all students who study in Statistics Department or in different major.</p> <p>Finally, he is an Editorial Board Member at more than 26 international and national journals</p>
<p>9. Keywords</p>	
<p>10. Course overview: The Bio-Statistics course is related to all majors such as Economics, Biology, Medical Analysis, Engineering, Finance, Business, Accounting, and so on. Furthermore, this course can make a decision in the sample that have collected from population and it is one of the important course for the researchers during their work in their thesis or dissertation.</p>	
<p>11. Course objective: There are variant important tests that students have to learn in this course before they go to the next stages. Students can learn these things in below.</p> <ul style="list-style-type: none"> A. Understanding types of data, and appropriate statistical tools for their analysis. B. Describing data using tables, graphs, or numbers. C. Testing hypothesis in different datasets D. Writing a report depending the results 	

E. Using statistics for generalizations and decision making.

F. Evaluate statistical conclusions based on experimental design.

12. Student's obligation

Students should follow these requirements in the class:

- Come to the class on time.
- Bring their lectures to the class in every day.
- Cheating will not be tolerated
- Using Social media is not allowed during the class
- Missing quizzes will not be repeated
- Bring their homework on time.

13. Forms of teaching

We use different methods of teaching in this course such as PowerPoint Presentation to show them the headings as well as using white board to explain each example clearly. After each subject, I will divide students to different groups and asked them to solve a specific problem together.

Furthermore, in the beginning of each class, I will make a quick review for the previous class and asked most of the students to know how much they understand in the last class, and then I will continue the new lecture. Finally, during the teaching class, I have asked some question for most of the students because I would like to participate all the students in my class.

14. Assessment scheme

Midterm exam: 20 % marks.

Class assignments & quizzes: there will be weekly class assignments and quizzes; 20 % marks.

There will be extra assignments, which give the students extra marks.

Final exam: 60 % marks.

The examination schedule will be announced by the exam board of the department of statistics.

15. Student learning outcome:

Students will learn:

- How to do data analysis in scientific research?
- What is the best test for different datasets?
- How to make a decision from the result in different types of data analysis?
- Testing hypothesis in different datasets.
- Evaluate result of the tests based on experimental design.

- Be a good data analyst in the future

16. Course Reading List and References :

1. Hazhar Bbas, Elementary Statistics, First Edition, 2016
2. PowerPoints Slides for whole semester
3. Bernard Rosner. Fundamentals of Biostatistics, Seventh Edition. USA: Brooks/Cole, Cengage Learning; 2011.
4. Rowe Philip. Essential statistics for the pharmaceutical sciences. England: John Wiley & Sons Ltd; 2007.
5. K, park. Park's textbook of preventive and social medicine, nineteenth edition. India: m/s Banarsidas Bhanot; 2007.

17. COURSE CONTENT

Week	Topic
1	Introduction of Statistics Process of Data Analysis in Statistics Source of Data Collection <ul style="list-style-type: none"> - Primary source data How do we build the best questionnaire form? <ul style="list-style-type: none"> - Secondary source data Sampling Method <ul style="list-style-type: none"> - Probability of Sampling Non-probability Sampling
2	Measures of Central Tendency <ul style="list-style-type: none"> - Mean, Median, and Mode Measures of Dispersion <ul style="list-style-type: none"> - Range, Variance, Standard Deviation, and CV
3	Introduction of BioStatistics Hypothesis testing <ul style="list-style-type: none"> - Null hypothesis - Alternative hypothesis
4	<ul style="list-style-type: none"> - Type I error and type II error - Significant level and power of the test
5	<ul style="list-style-type: none"> - Shape of distribution and Measures of Position - Measure of Skewness and Kurtosis Moments (M_r):- <ul style="list-style-type: none"> - Skewness ($C.S_k$) - Kurtosis
6	<ul style="list-style-type: none"> - Measures of Position

	- Standard Scores (Z- Scores)
7	- Quartiles and Five number summary - Side by side boxplot
8	- The Empirical Rule - Chebyshev Theorem
9-10	Normal Distribution Determining Normality Standard Normal Distribution - Finding Probability - Find area under normal distribution Kolmogorov and Smirnov Test
11	One Sample T-Test
12	Examples and group activity
13	Midterm exam
14	Independent Sample T-Test Paired Sample T-Test
15	Examples and group activity
16	Final Exam

18. Practical Topics (If there is any)	
We do not have any practical lessons at all.	
19. Examinations:	
<p>A medical researcher wishes to see whether the pulse rates of smokers are <i>higher</i> than the pulse rates of nonsmokers. Samples of 100 smokers and 100 nonsmokers are selected. The results are shown here. Can the researcher conclude, at $\alpha=0.05$, that smokers have higher pulse rates than nonsmokers?</p> <p>Mean Smoker = 90, SD Smoker =5, and Sample size of Smoker =100 Mean Non-Smoker = 88, SD Non-Smoker =6, and Sample size of Non-Smoker =100</p> <p>Solution:</p> <p>1. State Hypotheses. Null Hypothesis: $H_0: \mu_{\text{Smokers}} = \mu_{\text{Nonsmokers}}$ Alternative Hypothesis: $H_1: \mu_{\text{Smokers}} > \mu_{\text{Nonsmokers}}$</p> <p>2. Set alpha. Alpha = 0.05</p> <p>3. Determine the critical value. α is 0.05, one tail, and $d.f = n_1+n_2-2 = 100+100-2 = 198$. So, the critical value of one tail ($\alpha=0.05$, $df=198$) is: 1.6449</p>	

4. Calculate Test Statistics:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{SE_{diff}} = \frac{90 - 88}{0.781} = \frac{2}{0.781} = 2.561$$

5. We do reject the null hypothesis because test statistics = 2.561 is greater than the critical value = 1.6449, the population means are different which means the smokers have higher pulse rates than nonsmokers.

20. Extra notes:

Final exam will be determined by the exam board of the college.

Notice that, this syllabus may be subject to changes; we may take either longer or shorter time to finish them.

21. Peer review

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