



University of Salahaddin - Erbil

College: Administration and Economics

Department: Statistics and Information

Subject: Test of Hypotheses

Class: Years (4) **Semester:** (1)

Lecturer's Name: Dr. Omiad Saber Abdullah Shwany

Academic Year: 2024-2025

Course Book

1. Course name	Test of Hypotheses			
2. Lecturer in charge	Dr. Omiad Saber Abdullah			
3. Department/ College	Statistics and Information/ College of Administration and Economics			
4. Contact	e-mail: omiad.abdullah@su.edu.krd Tel: +9647504660477			
5. Time (in hours) per week	Theory: 2 Applied: 1			
6. Office hours	Sunday : (9:30-11:30)			
7. Course code:	Semester 1	Theoretical 2	Practical 1	ECTS
8. Teacher's academic profile	<p>Dr. Omiad Saber Abdullah, born on January 8, 1973, in Kirkuk, Iraq, is an assistant professor in the Department of Statistics and Informatics at Salahaddin University-Erbil, with more than 26 years of experience in teaching and research. He specializes in statistics and information, focusing particularly on experimental design and analysis. Dr. Abdullah is part of the College of Administration and Economics' teaching staff and has a notable history of contributing to the development of higher education strategies in Kurdistan and Iraq. His academic journey began with a B.Sc. in Statistics (1996-1997), followed by an MSc in Statistics (2002), and a PhD in Statistics (2012), all from Salahaddin University-Erbil's College of Administration and Economics. His professional milestones include serving as an assistant lecturer since 2002, being promoted to lecturer in 2012, and achieving the rank of assistant professor in October 2018. Throughout his career, He has supervised numerous research projects, focusing on educational statistics, experimental design, and the analysis of public health data, including studies on cancer incidence and the impact of COVID-19 in the region. He has published his work in various international journals, earning recognition for his contributions to educational methodologies and statistical analysis. In addition to his academic role, Dr. Abdullah served as the Director of Planning and Statistics in the Ministry of Higher Education and Scientific Research for around 12 years. He is also a member of the Kurdistan Economist Syndicate. His computing skills include proficiency in software such as SPSS, Statgraphics, SAS, MATLAB, Office programs, and VISIO. Dr. Abdullah is fluent in Kurdish, Arabic, and English. For more details about his work and publications, you can visit his profile on the Salahaddin University-Erbil academic website</p>			
9. Keywords	Statistics, Sampling, Measure of central tendency, Variance, Normal Distribution. P-Value, Type II Error, Type-I Error, CI			
<p>10. Course overview: At the end of this course the students will be able to:</p> <ol style="list-style-type: none"> 1- Data entry. 2- Analyze data 3- Describe the data 				
<p>11. Course objective: The course objectives for "Test of Hypothesis" focus on understanding the fundamental concepts of hypothesis testing, including null and alternative hypotheses, types of errors, significance levels, and p-values. It aims to develop students' skills in statistical inference, enabling them to make informed decisions based on sample data. Students will learn to conduct various hypothesis tests, such as one-sample, two-sample, paired tests, and tests for proportions, means, and variances, and will be trained to interpret the results effectively. The course also emphasizes applying hypothesis tests to real-world problems in areas like business, economics, and healthcare. Additionally, students will gain practical experience in using statistical software (e.g., SPSS, SAS, R) for data analysis, while understanding the limitations and assumptions of different testing methods.</p>				
<p>12. Student's obligation: Students taking the "Test of Hypothesis" course are expected to attend all lectures, actively engage in discussions, and complete assignments and homework on time to reinforce their understanding of the concepts. Practical exercises using statistical software are a key part of the course, allowing students to gain hands-on experience with hypothesis</p>				

testing. Preparing for exams by reviewing course materials is essential, as is conducting independent research projects where students formulate hypotheses and analyze data. Participation in group work fosters collaboration and the exchange of ideas. Students should seek help when needed and adhere to ethical standards, ensuring that their work is both honest and original.

13. Forms of teaching: the form of teaching by using data show, power point and give the hard copy before the lecture also for more explain the subject we use a white board.

14. Assessment scheme

Types of Activity	Frequency	Marks
Quiz		
Class Participation		
Homework		
Theory Mid-term Exam		
Theory Final Exam		
Total		

15. ECTS (Allocated Based On Student) Workload

16. Student learning outcome: Students should be able to

- 1- Breakdown of overall assessment and examination. Assessment of students are based on paper exam, quizzes both theoretical and practical method.

17. **COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES OF CIVIL ENGINEERING**
(Blank: no contribution, **I**: Introduction, **M**: Moderate, **G**: Good, **P**: Proficient, **A**: Advanced)

18. Prerequisite Courses:

19. Course Reading List and References:

A. The main text books are:

B. The secondary text books are:

20. The Topics: Theory and Applied

Weeks	Subjects	Brief description
1-4	Chapter One: Introduction to Hypothesis Testing	<ul style="list-style-type: none"> - What is Hypotheses - Parameter and Statistic - Testing of Hypothesis - The Null and Alternative hypothesis - Procedure of hypothesis testing - Significant Level - Types of Errors: Type One and Type Two Error - One Tailed and Two Tailed test - Nonstatistical Hypothesis Testing - Introduction - Concepts of Hypothesis Testing - Finding \bar{X}_L - Standardized Test Statistic - Finding and Interpreting the P-Value - Finding and Probability of a Type II Error β - Effects on β of Changing α - Judging the Test - power of a test

		<ul style="list-style-type: none"> - An Example about All
6-7	Chapter Two: Hypothesis Testing: One Sample Tests	<ul style="list-style-type: none"> - Inference About A Population - Inference With Variance Unknown - Testing μ when σ is unknown - Inference About Population Variance - Inference: Population Proportion - Selecting the Sample Size - Estimating Totals for Large Populations
8-11	Chapter Three: Inference About Comparing Two Populations	<ul style="list-style-type: none"> - Comparing Two Populations - Difference of Two Means - Making Inferences About two mean deference - When are variances equal - unequal variances - Confidence Interval - Two Dependent sample compression - Confidence Interval Estimator for μ_D - Inference about the ratio of two variances - Difference Between Two Population Proportions - Confidence Intervals
9-12	Chapter Four: Inference About Comparing More than Two Populations	<ul style="list-style-type: none"> - ANOVA - Multiple compression - LSD - Duncan test - Dunnatt's test
13-15	Chapter Five: Non Parametric test	

22. Examinations:

19. Examinations:

Mid-term exam and Final exam

All types of question (Solve problems.)

23. Extra notes:

24. Peer review:

Q1// from the following data and information:

(20 marks)

4	4	5	5	6	6	6	7	7	7	7	7	7	8	8	9	9	10	10	11
5	6	6	6	6	6	7	7	7	7	8	8	8	8	9	9	10	10	11	11

Tests of Normality	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	P-Value	Statistic	df	P-Value
X	0.170	40	0.005	0.951	40	0.082

(1) Test if the mean greater than 5 or not with five steps by using test value comparing with tabulated value, and find (2) P-Value, (3) \bar{X}_L , (4) $CI_{90\%}$, (5) $1-\beta$, with chart for All.

Q2// A user of a certain steel wire gauge suspects that the standard deviation of its breaking strength, in newtons (N), differs from the value of 0.75 as specified by the manufacturer. As a result, the user tests the breaking strength of each of a random sample of nine wire lengths and obtains the following results. (20 marks)

72.1	74.5	72.8	75.0	73.4	75.4	76.1	73.5	74.1
------	------	------	------	------	------	------	------	------

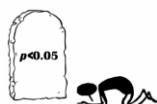
Assuming that the breaking strength is normally distributed, at the 5% level of significance, test the manufacturer's specification.

Q3// At an exit poll, voters are asked by a certain network if they voted Democrat (code=1) or Republican (code=2). Based on their small sample (40), can the network conclude that the Republican candidate will win the vote? At alpha 0.01 and find C.I.: (20 marks)

1	1	2	2	2	1	2	1	2	2	1	2	2	1	2	2	2	1	1	1
2	2	2	1	1	2	2	2	2	2	1	2	1	2	2	1	1	2	1	1

Q4// Answer (5) only:

(20 marks)



- 1) Describe this graph
- 2) If we increase sample size what happen to β ?
- 3) If we increase α what happen to Power of the test?
- 4) Our confidence interval after surveying will be $\hat{P} \pm 0.062$, at alpha 10%, if $P=0.5$, select the (n)?
- 5) from chi-square distribution select CV, CR, type I error, $1-\alpha$, one tail and two tail test.