The University of Jordan
College of Sciences
Department of Mathematics
Syllabus for Biostatistics for the Health Sciences

Course title	Biostatistics For the Health Sciences
Course number	(0301132)
Credit hours (theory, practical)	3
Contact hours (theory, practical)	3
Prerequisites/corequisites	None
Final Qualification	
Other department (s) involved in teaching the course	
Language of Instruction	English
Date of production/revision	2023

Course Coordinator: Ahmad Zghoul

Office hours: Tue 1:30-2:30, Mon 3:00-4:00
Email:a.zghoul@ju.edu.jo

Instructor: Iman aldarawi

Office hours: Tue 9:30-10:30, Mon 11:30-1:00
Email:i_aldarawi@ju.edu.jo

Course Description:

This course emphasizes on the nature and characteristics of the most commonly used statistical techniques (descriptive statistics, t-test, Chi-Square, and elementary hypothesis testing), and their applicability to specific health care problems within the context of medicine. Students develop skills and knowledge in the use of computing software and to reinforce learning through course work and assignments, including the analysis of data.

References:

A- ***Required Textbook***

Rosner, B. (2016), Fundamentals of Biostatistics. Cengage Learning.

B- ***Recommended Texts***

1) Daniel, W. (2005). Biostatistics: A foundation for analysis in the health sciences. New Jersey: John Wiley & Sons Inc.
2) Winner, L. (2004). Introduction to Biostatistics. Florida: Department of Statistics; University of Florida.
3) Munro, B. (2012). *Statistical methods for health care research* (6th ed.). Philadelphia: Lippincott.
4) Green, S., & Salkind, N. (2005). Using SPSS for Windows and Macintosh: Analyzing and understanding data (4th ed.). Upper Saddle River, NJ: Pearson – Prentice Hall.

Required Equipment: Computer and Software

Course aims and outcomes:

Successful completion of the course should lead to the following outcomes:

A. Knowledge and Understanding Skills: Student is expected to

1. Understand the basic statistical concepts and their application to health care Research.
2. Comprehend the conceptual basis of statistical inferences.
3. Differentiate between parametric and nonparametric tests and comprehend their underlying assumptions.
4. Decide what statistical technique will provide the best answer to a given research question.
5. Develop and understand the necessary computer skills using a software such as SPSS, MINITAB, or EXCEL in order to conduct basic statistical analyses.
6. Critically analyze and critique selected quantitative research reports and make judgment on the accuracy of the statistical techniques employed on those reports.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

B1. Compare between measures of central tendency and location.
B2. Interpret and understand the variance and standard deviation.
B3. Understand the concepts of random experiments and random variables.
B3. Understand statistical inference concepts and apply them properly.
B4. Be able to identify suitable statistical analysis to answer a research question.

C. Subject- Specific Skills: Student is expected to

C1. Summarize data in graphical and numerical way, using measures of location and dispersion.
C2. Compute probabilities using sample spaces and probability rules. Compute probabilities involving binomial and normal distributions.
C3. Apply the central limit theorem to problems involving sums and averages of variables
C4. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

D1. Choose the right method to summarize a dataset, graphically and numerically.
D2. Draw appropriate statistical conclusions about populations based on confidence estimates or based on hypotheses testing.
D3. Explain similarities/differences of statistical inferences based on confidence intervals and those based on hypothesis testing.

Topic Outline and Schedule:

Topic	Lectures
Introduction Course Syllabus Orientation. Introduction to and Overview of Texts. **Ch1. General Overview**	1
Ch 2: Descriptive Statistics 2.2 Measures of Location (Mean, Median, and Mode) 2.3 Some Properties of the Mean 2.4 Measures of Spread (Range, Quantiles & IQR, Variance and Standard Deviation) 2.5 Some Properties of the Variance and Standard Deviation 2.6 The Coefficient of Variation 2.8 Graphic Methods (Bar graph, Histogram, Box Plot). Problems: 2.1-2.5, 2.7-2.10, 2.12-2.18. (Use MINITAB)	4
Introduction to SPSS or MINITAB	2
Ch 3: Probability 3.1 Introduction 3.2 Definition of Probability 3.3 Some Useful Probabilistic Notation 3.4 The Multiplication Law of Probability 3.5 The Addition Law of Probability 3.6 Conditional Probability 3.7 Bayes' Rule and Screening Tests Problems: 3.1-3.25, 3.32-3.36, 3.68-3.73.	4
Ch 4: Discrete Probability Distributions 4.2-4.5 Random Variables, the probability-mass function, expected value, and the variance of a discrete random variable. 4.8-4.9 The Binomial Distribution and its mean & variance. Problems: 4.9, 4.10, 4.14, 4.17, 4.33 - 4.37.	2
Ch 5: Continuous Probability Distributions 5.3 -5.5 The normal distribution, properties of the standard normal distribution, conversion from non-standard to standard normal distribution. Problems: 5.1- 5.9, 5.14-5.16, 5.31-5.33, 5.36-5.39.	2
Ch 6: Estimation 6.2 The Relationship between Population and Sample 6.5 Estimation of the Mean of a Distribution (population mean), mean and variance of the sample mean, standard error of the mean, CLT, Interval estimation for μ. 6.8 Estimation for the Binomial Distribution (population proportion), interval estimation of	3

p. Problems: 6.5-6.9, 6.11-6.17, 6.27-6.32, 6.52-6.55.	
Ch 7: Hypothesis Testing: One-Sample Inference 7.2 General Concepts 7.3-7.4 One-Sample Test for the Mean of a Normal Distribution: One-Sided and Two-Sided Alternatives. 7.7 Sample-Size Determination (Based on CI length). 7.9 One-Sample Inference for the Binomial Distribution	3
Ch 8: Hypothesis Testing: Two-Sample Inference 8.2 The Paired t Test 8.3 Interval Estimation for the Comparison of Means from Two Paired Samples 8.4 Two-Sample t Test for Independent Samples with Equal Variances 8.5 Interval Estimation for the Comparison of Means from Two Independent Samples (Equal Variance Case)	3
Ch 10: Hypothesis Testing: Categorical Data 10.2 Two-Sample Test for Binomial Proportions 10.6 R x C Contingency Tables 10.7 Chi-Square Goodness-of-Fit Test	3
Ch 11: Correlation Coefficient 11.7 The Correlation Coefficient 11.8 Statistical Inference for Correlation Coefficients.	2
Ch 12: Multisample Inference 12.1 Introduction to the One-Way Analysis of Variance 12.2 One-Way ANOVA-Fixed-Effects Model 12.3 Hypothesis Testing in One-Way ANOVA-Fixed-Effects Model 12.4 Comparisons of Specific Groups in One-Way ANOVA	3
Overall Applications and Case Studies Using SPSS or MINITAB	6

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems.
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work with other students and to ask questions and seek help from your professor.
- Students are also encouraged to use basic scientific nonprogrammable calculators extensively and to use computer software supplements.

Evaluation Methods and Course Requirements:

Test1: 30%

Test2: 30%

Final Exam: 40%

Course Policies:

General Course Policies:

Attendance Policy:

Attendance is expected. Arrival on time is expected. Students who miss more than three class sessions with or without excuse will be dismissed from the course automatically. (See the university policies regarding absence).

Cell Phone Policy:

Cell phones should be turned off during class time. Disruption of class by ringing cell phones and cell phone conversations is inconsiderate of fellow students and faculty.

Examination Policy:

Students unable to take a scheduled exam are expected to inform the instructor within 3 days and make arrangements for a make-up one. Make ups will be given only to students who have notified the instructor and set up an alternate time. Any missed exam will result in a grade of zero for that particular examination type.

Academic Integrity:

Work submitted to the course instructor is assumed to be an expression of original ideas by the student. All students in this course are expected to adhere to university standards of academic integrity. Appropriate citation of the intellectual property of other authors is expected. Cheating, plagiarism, and other forms of academic dishonesty will neither be accepted nor tolerated. This includes, but is not limited to, consulting with another person during an exam, turning in written work that was prepared by someone other than you, and making minor modifications to the work of someone else and turning it in as your own. Ignorance will not be permitted as an excuse. If you are not sure whether something you plan to submit would be considered either cheating or plagiarism, it is your responsibility to ask for clarification.

Communications:

Contact by an email is highly encouraged and preferred.

Other than contacts by an email, contacts should take place during announced office hours and/or ONLY by appointment.

Contact on phones, preferably office number, also is welcomed during working hours.