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| **Hawler Medical University** | |
| **College of Health Sciences** | |
| **Department of** | **Medical Microbiology** |
| **Subject** | **Biostatistics** |
| **Course Book** | **3rd Stage** |
| **Lecturer's name** | **Alan Ghafur Rahim** |
| **Academic Year:** | ***2022-2023*** |

**Course Book**

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| **1. Course name** | | Biostatistics |
| **2. Lecturer in charge** | | Alan Ghafur Rahim |
| **3. Department/ College** | | Clinical Biochemistry / College of Health Sciences |
| **4. Contact** | | e-mail: alan.rahim@su.edu.krd |
| **5. Time (in hours) per week** | | Theory: 2 hours. Practical: 2 hours. |
| **6. Office hours** | |  |
| **7. Course code** | |  |
| **8. Teacher's academic profile** | | I was awarded a B.Sc. in Statistics from the University of Salahaddin in 2007.  I  received a M.Sc. degree in applied statistics at Salahaddin University in 2011. After getting my master degree I was appointed as an assistant lecturer at the department of Statistics/Salahaddin University in 2012. I gained Ph.D. degree in applied statistics at at Salahaddin University- Erbil in 2022. I taught a wide range of subjects at undergraduate level including  Probabilities, Applied Statistics, Principles of Statistics, Biostatistics, Hypothesis Testing, Survey and Quality Control.  I like to keep myself busy and put all of my effort and enthusiasm into my tasks. I enjoy working with others and I have good communication with other researches and academic staff. |
| **9. Keywords** | | One Sample t-Test, Independent Sample t-Test, Paired Sample t-Test, ANOVA, Chi-Square. |
| **10. Course overview:**  The Bio-Statistics course is related to all majors such as Biology, Medical Analysis, Vital Health, and so on. Furthermore, this course can make a decision in the sample that have collected from the population and it is one of the important courses for researchers during their work in their thesis or dissertation. It is carefully designed for students who are struggling with Statistics, for those who are not quantitatively inclined, and for complete beginners in Statistics.  After completing this course, you will have a complete understanding of Hypothesis Testing for population means and will be able to easily answer exam-style questions. I teach using intuitive step-by-step explanations and assume students have absolutely no background in Statistics. | | |
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| **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.  1. Understanding types of data, and appropriate statistical tools for their analysis.  2. Describing data using tables, graphs, or numbers.  3. Testing hypothesis in different datasets  4. Writing a report depending the results  4. Using statistics for generalizations and decision making.  5. Evaluate statistical conclusions based on experimental design. | | |
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| **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. | | |
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| **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 | | |
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| **16. Course Reading List and References‌:**   1. PowerPoints Slides for whole semester 2. Bernard Rosner. Fundamentals of Biostatistics, Seventh Edition. USA: Brooks/Cole, Cengage Learning; 2011. 3. Rowe Philip. Essential statistics for the pharmaceutical sciences. England: John Wiley & Sons Ltd; 2007. 4. K, park. Park's textbook of preventive and social medicine, nineteenth edition. India: m/s Banarsidas Bhanot; 2007. 5. Marcello Pagano & Kimberlee Gauvreau. Principles of Biostatistics, Second edition. New York: Taylor & Francis Group,LLC;2018 6. Marc M. , Mario F. & Jayson Roy. Biostatistics for the Biological and Health Sciences, Second edition. U.S.A: Pearson Education, Inc;2018 | | |
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| **17. Theoretical Topics:** |  | |
| 1 | Introduction of Statistics  Process of Data Analysis in Statistics  Source of Data Collection  Sampling Method   * Probability of Sampling * Non-probability Sampling | |
| 2 | Measures of Central Tendency   * Mean, Median, and Mode   Measures of Dispersion  Range, Variance, Standard Deviation, and CV | |
| 3 | Measure of Skewness   * Skewness () | |
| 4 | Normal Distribution | |
| 5 | Hypothesis testing   * Null hypothesis   Alternative hypothesis | |
| 6 | * Type I error and type II error * Significant level and power of the test | |
| 7 | One-Sample T-Test | |
| 8 | Independent Sample T-Test | |
| 9 | Paired Sample T-Test | |
| 10 | Exam Midterm | |
| 11 | One Way ANOVA | |
| 12 | Two Way ANOVA | |
| 13 | Chi-Square Test | |
| **18. Practical Topics (If there is any):** |  | |
| 1 | Define Variable View in SPSS Program | |
| 2 | The data editor, the data view and the variable view | |
| 3 | Split file--select case-weighted case | |
| 4 | Define multiple response set and other submenus | |
| 5 | Transformations menu- Compute variable-Recode in to same variables | |
| 6 | Analyze menu (Descriptive Statistics- Frequency and Descriptive) | |
| 7 | Explore - Crosstabes | |
| 8 | Compare Mean ( One Sample T-Test) | |
| 9 | Independent Samples T-Test and Paired Samples T-Test and | |
| 10 | One Way ANOVA | |
| 11 | Correlation | |
| 12 | Regression | |
| 13 | Chi-Square Test | |
| 14 | Non- Parametric Test (One Sample) | |
| 15 | Non- Parametric Test (Two Sample) | |
| **19. Examinations: Types of questions may be:**  A medical researcher wishes to see whether the pulse rates of smokers are *higher* 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 𝛼=0.05, that smokers have higher pulse rates than nonsmokers?  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  **Solution:**  1. State Hypotheses.  Null Hypothesis: H0: μ Smokers = μ Nonsmokers  Alternative Hypothesis: H1: μ Smokers > μ Nonsmokers  2. Set alpha. Alpha = 0.05  3. Determine the critical value.  α is 0.05, one tail, and d.f = n1+n2-2 = 100+100-2 = 198.  So, the critical value of one tail (α=0.05, df=198) is:  4. Calculate Test Statistics:    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. | | |
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| **20. Extra notes:** | | |
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| **21. Peer review:** | | |