****

**Department of Mathematics**

**College of Education**

**University of Salahaddin**

**Subject:Mathematical Statistics**

**Course Book – (Year 3)**

**Lecturer's name : Awaz shahab mohammad**

**Academic Year: 2021/2022**

**Course Book**

|  |  |  |  |
| --- | --- | --- | --- |
| **1. Course name** | | Mathematical Statistics | |
| **2. Lecturer in charge** | | m.awaz shahab mohammad | |
| **3. Department/ College** | | Mathematics / Education | |
| **4. Contact** | | e-mail:ivan.awaz –shahab @yahoo.com  Tel: (optional) | |
| **5. Time (in hours) per week** | | Theory: 3 hours | |
| **6. Office hours** | | Sunday 12 -2 am  Wednesday 9-11 am | |
| **7. Course code** | |  | |
| **8. Teacher's academic profile** | | Awaz shahab–assit .lect. mathematics teacher  mathematics teacher work in college of education  Kurdistan region-Iraq, Erbil  *Current*: Salahaddin University college of education mathematics department.  *Education*:  M.Sc. in statistic. | |
| **9. Keywords** | |  | |
| **10. Course overview:**  Mathematical Statistics course is designed as one of the main core courses for Third year undergraduate students with prior knowledge of Mathematical statistics (Mathematical Statistics and Statistical inferences). It is continue “theory of Statistics and statistical inferences”, starting with a comprehensive revision of the main concepts of mathematical statistics and analytic the data then the rest of the course will be devoted to multi random variable, estimation and testing hypothesis with solving real life problems. | | | |
| **11. Course objective:**  As a result of successfully completing this course, the student will possess a basic understanding of Mathematical probability and statistics inferences to provide Mathematical statistical background for sampling theory and combination and drawing inferences for the populations under study. | | | |
| **12. Student's obligation**  in this year we take some quiz ,the student must prepare report and take two assignments, determine the active students. | | | |
| **13. Forms of teaching**  Different forms of teaching will be used to reach the objectives of the course: power point presentations for the head titles and definitions ,figure and summary of conclusions, classification of materials and any other illustrations. | | | |
| **14. Assessment scheme**  -Midterm exam degree (40%) is calculated as follows:-  - Theory: 25 marks  - Practice: 15 marks  - Final exam degree (60%) is calculated as follows:  Theory: 40 marks  Practice: 20 marks | | | |
| **15. Student learning outcome:**  For this course, different forms of teaching methods such as the lecture method, multimedia presentations, group discussions, and spread sheet assignments will be used throughout the course. Work will be done individually and/or in small groups. The primary focus of the teaching methodologies used will be to prepare the student to understand Mathematical statistics and analytic the data, and then introduce students to main concepts of mathematical statistics, statistical inferences which will help them apply the statistical tools learned to real life situations. Thus enough time will be devoted to interactive learning and problem solving. The readings will come from the required text books as well as additional references such as internet resources and other to be provided by the instructor. Lectures and tutorials will enable the instructor and students to expand on the material presented in the readings. | | | |
| **16. Course Reading List and References‌:**  1-Hogg, R. and Graig, A. (1978), *Introduction to mathematical Statistics*, Collier Macmillan 4th edition, New York. (Required)  2-Larson, R. And Marx, M. (2006), *Introduction to Mathematical Statistics and Applications,* London, Pearson education Ltd. (Optional)  3-RAO, C. (2009), *Linear Statistical Inference and its Application*, London, John Wiley & Sons. (Optional)  4-Wani, J. (1971), *Probability & Statistical Inference*, USA, Meredith Corporation. (Required)  5-Al*-Nasi,H.Rashid(1988), Statistical Inference.* | | | |
| **17. The Topics:** | | | **Lecturer's name** |
| 1 | Introduction to the Mathematical Statistic (some basic concepts and definitions, Continuous random variable and probability distribution  ( Normal ,Exponential ,Gamma and Chi-square ,Beta distribution) | | m.Awaz  (3hrs T) |
| 2,3,4 | Summary on Elementary Statistics Bivariate and Multivariate Random Variables ,Transformation and Change ofVariables. | | m.Awaz  (3 hrs T) |
| 5,6 | T and F distributions, Order Statistics. | | m.awaz  (3 hrs T) |
| 7 | Examination | | (3 hrs T) |
| 8,9,10,11,12,13,14 | Estimation(Some Special Definitions,The Point and Interval Estimation ,Good Estimation,Unbiaseness of Estimator,Mean Square Error,Sufficiency of estimator,Efficiency of Estimator ,Consistency of Estimator,FactorizationCriterion,Exponential Family of Distribution,Rao-Black Weel Theorem, Completeness and Minimization Variable ,Fisher Information ,GrammerRao Theorem, Generalization of GrammerRao Lower Bounded | | (3 hrs T) |
| 15,16 | The Method Of Estimation( Method of (likelihood Estimation)(Calcullating of M.L.e.,Properties of M.L.e., Large Sample Properties | | (3 hrs T) |
| 17,18,19,20 | Interval Estimation( Some Special Definitions, Confidence Interval For The Mean of a Normal Population(Confidence Interval For The Mean when the variance Known, Confidence Interval For The Mean when the variance Un known ), Confidence Interval For The Difference of Mean , Confidence Interval For The Difference of Mean When The Two Variance are Known, Confidence Interval For The Difference of Mean When The Two Variance are Unknown, Confidence Interval For The Variance, ConfidenceInterval For The Parameter of The Binomial Distribution. | | (3 hrs T) |
| 21,22,23,24,25,26 | The Testing of Hypothesis( Some Special Definitions and Example, Simple Hypothesis,TheNeyman –Person Lemma,Unbiased and InverientTest,Uniformly Most Powerful Test, The Likellihood Ratio Test, Size and Power Of The Test | | (3 hrs T) |
| 27 | Examination | | (3 hrs T) |
| 28 | Final Examination | |  |
| 18. Examinations:  Q1)Let be a random sample of size 9 from normal distribution and  be a random sample of size 13 from normal distribution .Assume the two random sample are independent random variables ,let  and find 98% confidence interval for . (10G)  Q2) State and proof -distribution. (10G)  Q3) Let  be a random sample of size from binomial probability distribution function  Find  for parameter  . (10G)  Q4) Let denote the order statistics of a random sample of size (5) from a distribution  then show that  are independent. (10G) | | | |
| 19. Extra notes:  -------------- | | | |
|  | | | |