

| | | | | | |
|---------------------------------------|--|-----------------------------|-----------------------------|--|---|
| Course Code | ADU5305 | | | | |
| Level | 05 | | | | |
| Course Title | Statistical Inference | | | | |
| Credit value | 3 | | | | |
| Core/Optional | Optional | | | | |
| Prerequisites | ADU4300(Pass / valid OCAM / CR) | | | | |
| Hourly breakdown | Theory | Practical hours | Independent Learning | Assessments | Total hrs |
| | 20 X 2 = 40 hrs | DS hrs = 4X3 = 12 hrs | - | <ul style="list-style-type: none"> ▪ Sessions (20x 3) = 60 hrs ▪ Online /Audio-visual materials and other learning resources = 18 hrs ▪ Other(additional reading) = 18 hrs | <ul style="list-style-type: none"> ▪ Continuous Assessments (CA) = 2 hrs |
| Course Aim/s. | Main aim of the course is to introduce the concepts of statistical inference and its applications. | | | | |
| PLOs addressed by course | <p>PL01: Knowledge: Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the degree.</p> <p>PL02: Practical Knowledge and Application. Demonstrate the competency to use the knowledge and practical skills appropriately.</p> <p>PL03: Communication: Demonstrate the competency in communicating efficiently and effectively to present information, ideas and concepts to the scientific community as well as to the wider society.</p> <p>PL04: Individual Work, Team Work and Leadership: Demonstrate the competency in working independently and in groups in addressing issues in multi-disciplinary environments and completing the tasks on time through collaborative learning while exhibiting leadership.</p> <p>PL05: Creativity and Problem Solving: Identify and analyze problems using quantitative and/or qualitative approaches using scientific methodology to provide valid conclusions.</p> <p>PL06: Adaptability and Flexibility: Demonstrate the ability to adapt to diverse working environments using flexible approaches and strategies.</p> <p>PL07: Information and Communication Technology Literate: Demonstrate the competency of using Information and Communication Technology for numerical and statistical analysis, and in day to day applications.</p> <p>PL08: Vision for Life: Develop the capacity to project for future through identifying self-directed goals and continuously targeting towards them for self-improvement by undertaking further studies.</p> <p>PL09: Lifelong Learning: Develop the capacity to foresee new trends and their impacts and continuously update knowledge and develop skills willingly to meet those future challenges.</p> | | | | |
| Course Learning Outcomes (CLO) | <p>At the completion of this course student will be able to</p> <p>CLO1: Describe the terms population, sample, statistical inference, variable & random variable, parameter, estimation and test of hypothesis to the context of application in Statistics (PLO1, PLO2)</p> <p>CLO2: In a given application identify the population of interest and its types(finite, existing, infinite, imaginary), the variables interest, parameters of interest and type of inference required(estimation/test of hypothesis) (PLO1-PLO9)</p> <p>CLO3: Describe the terms estimation, estimating equation, estimator, sampling distribution, accuracy, precision, unbiased estimator, biased estimator, bias of an estimator, mean squared error, root mean squared error, relationship between MSE, variance and bias, Markov inequality to find a bound on error. (PLO1-PLO9)</p> <p>CLO4: Prove that sample mean, sample variance, population variance and sample proportion are unbiased estimatos for population mean, population variance and population proportion. Derive the mean square error of the above estimators. Apply the above estimators to estimate the population parameters. (PLO1-PLO9)</p> <p>CLO5: Determine the sample size require to obtain an estimate with a given bound on the error at a given level of confidence. (PLO1- PLO9)</p> <p>CLO6: Derive and estimate method of moment estimates for the parameters in commonly used distributions. (PLO1-PLO9)</p> <p>CLO7: Derive and estimate method of maximum likelihood estimates for the parameters in commonly used distributions. (PLO1-PLO9)</p> <p>CLO8: Derive and find confidence intervals for mean of a distribution, variance of a normal distribution, population proportion of a normal distribution, difference between the means of distributions, ratio between two variances of two normal distributions, difference between two proportions when samples are large. (PLO1-PLO9)</p> | | | | |

| | | |
|--|--|-------------------------------------|
| | <p>CLO9: Describe the terms null hypothesis, alternate hypothesis, simple hypothesis, composite hypothesis statistical test, test statistic, critical value, decision rule, type I error, type II error, significance level, power of the test and size of the test. (PLO1-PLO9)</p> <p>CLO10: Formulate suitable null and alternative hypothesis for relatively simple problems and describe type I error and type II error related to the problem. (PLO1-PLO9)</p> <p>CLO12: Test hypotheses concerning the means of a random variable using the appropriate test for the situation, the variance of normal distributions and hypotheses concerning proportions, the ratios of two variances of normal distributions, the difference between two means, and the difference between two proportions. (PLO1- PLO9)</p> | |
| Content (Main topics, sub topics) | Statistical Inference Introduction to statistical inference, Introduction to point estimation, Properties of estimators, Estimation of population mean, Estimation of population variance, Estimation of population proportion, Method of moments, Method of maximum likelihood, Properties of maximum likelihood estimators, Other methods for estimation, Confidence intervals, Tests of hypotheses | |
| Teaching Learning methods (TL) | <p>: Self-Learning/Independent learning of Self-study</p> <ul style="list-style-type: none"> ▪ Instructional Material (IL) ▪ Online Activities (OL) ▪ Reference Work (RF) <p>Compulsory contact sessions</p> <ul style="list-style-type: none"> ▪ Assessments (AS) and Feedback – MCQs (MCQ); Structured Essay (SEQ); Essay Questions (ES); <p>Non-compulsory contact sessions</p> <ul style="list-style-type: none"> ▪ Day Schools (DS) ▪ Group Projects (GP) | |
| Assessment strategy | Overall Continuous Assessment Mark (OCAM): 40% | Final Assessment (FA): 60% |
| | <p>Details: Continuous Assessment1 (CAT1): -1hr Continuous Assessment2 (CAT2): -1hr Group Projects (GP) OCAM=60%Maximum(CAT1, CAT2) + 40%Minimum(CAT1, CAT2)+ GP subject to maximum 100%</p> | Final Evaluation -Theory: 100%-2hrs |
| Recommended Readings: | <ul style="list-style-type: none"> • Kiefer, J.C.(1987) <i>Introduction to Statistical Inference</i>, Springer text in statistics • Mukhopadhyay 2000), N. <i>Probability and Statistical Inference</i>, CRC press, India | |