UNIVERSITY OF CALICUT
G & A - IV - K SECTION

No. 194023/GA-IV-K-ASST-2/2024/Admn Calicut University.P.O

Dated: 15.03.2025

From

The Registrar

To

The Principal

Sacred Heart College(Autonomous), Chalakudy

Sir

Sub:- Syllabus of Psychological Statistics course (Allied Core for the Integrated M.Sc. Psychology programme, 2024–25 admissions)-Approved-reg

Ref:- 1. Your Letter dated 20.02.2025 forwarding the syllabus of Psychological Statistics course (Allied Core for the Integrated M.Sc. Psychology programme, 2024–25 admissions)

2. Remarks of the Chairperson,BoS in Statistics(UG).

3. Orders of the Vice-chancellor, dated 14.03.2025

With reference to the above, it is informed that the Board of Studies in Statistics (UG) vide reference cited (2) above, has approved the syllabus of Psychological Statistics course (Allied Core for the Integrated M.Sc. Psychology programme, 2024–25 admissions) submitted by Sacred Heart College(Autonomous), Chalakudy.

The Vice-Chancellor has approved the above resolution of the Board of Studies and it is hereby communicated for your necessary action. Please find the approved syllabus attached for your reference.

Yours faithfully

Ajayakumar T.K
Assistant Registrar
(For The Registrar)

SACRED HEART COLLEGE (AUTONOMOUS), CHALAKUDY

BOARD OF STUDIES
PSYCHOLOGICAL STATISTICS
(Allied Core to M. Sc Integrated Psychology Degree)
(CBCSS-PG-2024)

SYLLABUS & SCHEME
2024 ADMISSION ONWARDS

PROGRAMME OUTCOMES (PO):

At the end of Integrated M. Sc programme at Sacred Heart College (Autonomous), a student will have obtained:

PO1	Knowledge Acquisition: Commitment to lifelong learning and staying with statistical awareness for the research and analysis in Psychology.
PO2	Critical Thinking and Scientific Inquiry: Mastery of critical thinking skills helps to identify the assumptions that frame our thinking and actions, checks out these assumptions are accurate and valid to make the decisions.
PO3	Integration of Multidisciplinary Approaches: The ability to integrate knowledge from statistics to analyse complex psychological phenomena and real-world issue.
PO4	Problem Solving and Analytical Skills: Acquiring extended mathematical skills for problem solving and statistical knowledge for performing analysis in Psychology.

PROGRAMME SPECIFIC OUTCOMES (PSO):

At the end of Integrated M.Sc. Psychology at Sacred Heart College (Autonomous), a student will have developed:

PSO1	Demonstrate the ability in collection, presentation, analysis and interpretation of data.
PSO2	Understand and solve problems in probability, statistical distributions, correlation and regression.
PSO3	Understand and solve problems in hypothesis testing (statistical inference) and also understand sampling theory.
PSO4	Understand and apply the techniques used in design of experiments and ANOVA.

BOARD OF STUDIES MEMBERS IN PSYCHOLOGICAL STATISTICS

Sl. No	NAME	DESIGNATION & OFFICIAL ADDRESS
1.	Mr. Sankaran K.K	Associate Professor, Head of the Department of Statistics, Sree Narayana College, Nattika, Thrissur.
2.	Mr. Jinto E J	Assistant Professor (on contract) Department of Statistics Sacred Heart College (Autonomous), Chalakudy.
3.	Mr. Ravikumar K	Associate Professor, Head of the Department of Statistics, Government Victoria College, Palakkad.
4.	Ms. Nibha P Raj	Assistant Professor, Department of Statistics, Govinda Pai Memorial Government College, Manjeshwar.
5.	Mrs. Manjusha Murali	Assistant Professor, Department of Statistics, Govinda Pai Memorial Government College, Manjeshwar.
6.	Mr. Arun Mathew	Senior Machine Learning Engineer, Trenser Technology Solutions (P) Ltd, Trivandrum.
7.	Anila Benny	Business Analyst, The Strategist Business Management Consultancy, Kochi

PSYCHOLOGICAL STATISTICS

(Allied Core to Integrated M. Sc Psychology, 2024 admission onwards)

Semester Number	Courses	Course code	Course Title	Hours/Weeks	Credit
1	Allied Core-2	STA1IC02	Descriptive Statistics	4	3
2	Allied Core-2	STA2IC02	Regression analysis and Probability theory	4	3
3	Allied Core-2	STA3IC02	Probability distributions and Parametric tests	5	3
4	Allied Core-2	STA4IC02	Statistical techniques for Psychology	5	3

EVALUATION SCHEME FOR CORE AND OPEN COURSES

The evaluation scheme for each course shall contain two parts

1) Internal assessment 2) External Evaluation

20% weight shall be given to the internal assessment. The remaining 80% weight shall be for the external evaluation.

Internal Assessment:

20% of the total marks in each course are for internal examinations. The internal assessment shall be based on a predetermined transparent system involving written tests, Class room participation based on attendance in respect of theory courses and lab involvement/records attendance in respect of Practical Courses.

Internal assessment of the project will be based on its content, method of presentation, final conclusion and orientation to research aptitude.

Components with percentage of marks of Internal Evaluation of Theory Courses are- Test paper 40%, Assignment 20%, Seminar 20% and Class room participation based on attendance 20%.

Table 1: Components for Evaluation

Serial Number	Components	Marks
1	Classroom participation based on attendance	3
2	Test paper	6
3	assignment	3
4	Seminar/viva	3
	Total	15

For the test paper marks, at least one test paper should be conducted. If more test papers are conducted, the mark of the best one should be taken.

Table 2: Split up of marks for test paper

Range of marks in test paper	Out of 6 marks (maximum internal marks is 15)
Less than 35 %	1
35%- 45%	2
45%-55%	3
55%-65%	4
65%-85%	5
85%-100%	6

Table 3: Split up of marks for classroom participation

Rate of CRP	Out of 3 marks (maximum internal marks is 15)
50% ≤CRP<75%	1
75% ≤CRP<85%	2
85% and above	3

External Evaluation:

External evaluation carries 80 % of the marks.

The Allied Core courses have 3 credits and will have external examinations having the duration of 2 hours with maximum 60 marks. Internal marks are out of 15.

Scheme of Examinations:

The external Question Paper is with a maximum of 60 marks and Internal examination is of 15 marks. Duration of each external examination is 2 Hrs. The pattern of External Examination is as given below.

The students can answer all the questions in Sections A & B. But there shall be Ceiling in each section.

Section A

Short Answer Type Questions, 12 Questions, Each carry 2 marks, Ceiling- 20 Marks

Section B

Short Essay/Paragraph Type Questions, 7 Questions, Each carry 5 marks, Ceiling- 30 Marks

Section C

Essay Type Questions, Two Questions and Each carry 10 marks, Answer any one question-10 Marks.

SEMESTER 1 - Allied Core

STA1IC02- DESCRIPTIVE STATISTICS

Course Outcome	CO Statement	PO	PSO	Cognitive Level	Class Hours
CO1	To generate interest in Statistics	1,4	1	U	20
CO2	To equip the students with the concepts of basic Statistics	1,4	1	U, A	20
CO3	To provide basic knowledge about Statistical methods	1,4	1	U, A	32

- **Remember (R), Understand (U), Apply (A), Analyse (Z), Evaluate (E) & Create (C).**

Module 1: A basic idea about data- collection of data, primary and secondary data, organization, planning of survey and diagrammatic representation of data - **10 Hours**

Module 2: Classification and tabulation- Classification of data, frequency distribution, formation of a frequency distribution, Graphic representation viz. Histogram, Frequency Curve, Polygon, Ogives, Bar diagram and Pie diagram - **10 Hours**

Module 3: Measure of central tendency- Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, Combined Mean, Advantages and disadvantages of each average - **20 Hours**

Module 4: Measures of dispersion- Range, Quartile Deviation, Mean Deviation, Standard Deviation, Combined Standard Deviation, Percentiles, Deciles, Relative Measures of Dispersion, Coefficient of variation - **16 Hours**

Module 5: Skewness and Kurtosis- Pearson's and Bowley's coefficient of skewness, Percentile Measure of Kurtosis - **16 Hours**

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., & Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E & Woodworth, R.S. Statistics in Psychology and Education, Bombay: Vakila Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5. Mukhopadhyay P. Mathematical Statistics. New central Book Agency (P) Ltd: Calcutta.

FIRST SEMESTER EXAMINATION

STATISTICS-ALLIED CORE

Time: 2 Hours **Max Marks: 60**

SECTION-A

Each question carries 2 Marks.
Maximum Marks that can be scored from this section is 20.

1. Compare less than and greater than Ogives.
2. What do you mean by percentiles?
3. Define geometric mean
4. What is the variance of the observations 8, 10, 12?
5. How will you find range of a grouped frequency distribution?
6. What is meant by relative measure of dispersion?
7. Define quartile deviation
8. Distinguish between discrete and continuous data. Give examples.
9. The average pulse rate of 40 males was found to be 78 and that of a group of 60 females was 69. Find the combined meanpulse rate of the 100 patients.
10. What is combined standard deviation?
11. What are the advantages of median?
12. Draw a bar diagram depicting the following data

Year	1992	1993	1994	1995
Export (in crore)	55	63	60	70

SECTION-B

Each question carries 5 Marks.
Maximum Marks that can be scored in this section is 30.

13. Explain Kurtosis. What are different types of the Kurtosis?
14. Discuss the graphical methods used for representing the frequency distribution.
15. The blood serum cholesterol levels of 10 patients are givenbelow. Calculate the S.D. and C.V.
    220, 230, 240, 250, 260, 270, 280, 255, 265, 290
16. Write the importance of diagrams and graphs for data analysis
17. Define classification. What are the different types of classification?
18. Explain Quartile deviation. What are its advantages?
19. Calculate AM and SD for the following data.

Class	10-14	14-18	18-22	22-26	26-30
Frequency	20	30	11	3	5

SECTION-C

*(Answer **any one** question and it carries 10 marks)*

20. Calculate the mean deviation about the mean for the given data.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	4	8	12	15	12	6	3

21.

(a) Define Skewness. What are the different types of Skewness?

(b) Calculate Karl Pearson's Coefficient of skewness for the Following frequency distribution.

Class	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-104
frequency	8	15	18	25	14	9	6	5

SEMESTER 2 - Allied Core

STA2IC02- REGRESSION ANALYSIS AND PROBABILITY THEORY

Course Outcome	CO Statement	PO	PSO	Cognitive Level	Class Hours
CO1	To make students aware of the various Statistical tools	1,4	2	U, A	36
CO2	To create awareness of probability	1,4	2	U, A	20
CO3	To generate awareness of random variables	1,4	2	U	16

Module 1: *Bivariate data*- relationship of variables, correlation analysis**,** methods of studying correlation, Scatter Diagram, Karl Pearson's Coefficient of Correlation, Calculation of Correlation from a 2-way table, Interpretation of Correlation Coefficient, Rank Correlation. **11 Hours**

Module 2: *Regression analysis*- linear regression, Regression Equation, Identifying the Regression Lines properties of regression coefficients, numerical problems. **9 Hours**

Module 3: *Partial and Multiple Correlation Coefficients*- Multiple Regression Equation, Interpretation of Multiple Regression Coefficients (three variable cases only). **16 Hours**

Module 4: *Basic probability* -Sets, Union, Intersection, Complement of Sets, Sample Space, Events, Classical, Frequency and Axiomatic Approaches to Probability, Addition and Multiplication Theorems, Independence of Events (Up-to three events). **20 Hours**

Module 5: *Random Variables and their probability distributions*- Discrete and Continuous Random Variables, Probability Mass Function, Distribution Function of a Discrete Random Variable. **16 Hours**

References

1. Gupta, S.P. *Statistical Methods*. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., &Kapoor, V.K. *Fundamentals of Applied Statistics*. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., &Woodworth, R.S. *Statistics in Psychology and Education*: Bombay, Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. *Introduction to Theory of Statistics*. 3rd Edition Paperback – International Edition.
5. Mukhopadhyay, P. *Mathematical Statistics.* New central Book Agency (P) Ltd: Calcutta.

SECOND SEMESTER EXAMINATION
Statistics- Allied Core

STA2IC02–REGRESSION ANALYSIS ANDPROBABILITY THEORY

Time: 2 Hours **Max Marks: 60**

SECTION-A

Each question carries 2 Marks.
Maximum Marks that can be scored in this section is 20.

1. Define Spearman's rank correlation coefficient
2. Distinguish between discrete and continuous variables
3. What is meant by a scatter diagram?
4. State the Multiplication theorem of probability for two events
5. Define probability mass function
6. Define sample space. Give one example
7. Define the following
   (a) Disjoint set
   (b) Universal set
   (c) Null set
8. If $P(A) = 0.3,\ P(B) = 0.6$ and $P(A \cap B) = 0.2$, then find $P(A \cup B)$.
9. If $f(x) = kx; x = 1,2,3$ and zero elsewhere is a probability mass function, then find $P(X \geq 2.5)$.
10. If $r_{12} = 0.93, r_{13} = 0.99$ and $r_{23} = 0.92$, then calculate $r_{12.3}$.
11. Consider the following probability mass function.

x	-1	0	2
f(x)	k	2k	3k

Find the value of k.

12. Distinguish between mutually exclusive events and mutually exhaustive events

SECTION-B

Each question carries 5 Marks.
Maximum Marks that can be scored in this section is 30.

13. Distinguish between partial correlation and multiple correlations
14. What is meant by linear regression? What are two regression lines? Give their equations.
15. Explain the different approaches to the theory of probability.

16. State addition theorem in probability. A problem in mathematics is given two students A and B. Whose chances of solving it are 1/3 and 2/3 respectively. What is the probability that the problem will be solved?

17. If $\sigma_x = 6, \sigma_y = 10$ and $Cov(x, y) = -30$, then find the correlation between X and Y. Comment on the same. Also find the regression coefficients.

18. In a box there are 8 white, six blue and 10 pink balls. If 3 balls are drawn at random from the box, what is the probability that

(a) Two balls are white

(b) None of 3 is pink

(c) 3 balls are blue

19. Define the distribution function of a discrete random variable. Also write its properties

SECTION-C

(Answer any one Question and it carries 10 marks)

20. A random variable X has the following probability function.

x	-1	0	2
$f(x)$	k	$2k$	$3k$

(a) Determine the value of k.

(b) Find $P(X = 1)$ and $P(X \leq 2)$.

(c) Write down the distribution function of X.

21.

(i) State the important properties of Karl Pearson's coefficient of correlation.

(ii) Calculate the correlation coefficient for the following data

X	7	15	13	3	10	12
Y	27	45	51	9	33	51

SEMESTER 3 - Allied Core

STA3IC02- PROBABILITY DISTRIBUTIONS AND PARAMETRIC TESTS

Course Outcome	CO Statement	PO	PSO	Cognitive Level	Class Hours
CO1	To get a general understanding on various standard probability distributions	1,4	3	U, A	25
CO2	To familiarize the methods of sampling	1	3	U	20
CO3	To familiarize the uses of statistical test.	2,3,4	3	U, A, Z, E	45

Module 1: Distribution Theory- Binomial, Poisson and Normal Distributions, Mean and Variance (without derivations), Numerical Problems, Fitting, Importance of Normal Distribution, standard normal distribution, simple problems using standard normal tables, Central Limit Theorem (Concepts only). **25 Hours**

Module 2: Methods of Sampling- Random Sampling, Simple Random Sampling, Stratified, Systematic and Cluster Sampling, Non-random sampling, Subjective sampling, Judgment sampling and convenience sampling. **20 Hours**

Module 3: Fundamentals of Testing- Type-I & Type-II Errors, Critical Region, Level of Significance, Power, p value, Tests of Significance. **15 Hours**

Module 4: Large Sample Tests – Test of a Single, Mean Equality of Two Means, Test of a Single Proportion, and Equality of Two Proportions. **10 Hours**

Module 5: Small Sample tests - Test of a Single Mean, Paired and Unpaired t-test, Chi-Square test of variance, F-test for the Equality of Variance, Tests of Correlation. **20 Hours**

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., &Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Son
3. Garret, H.E., &Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.
4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition.
5.Mukhopadhyay, P. Mathematical Statistics. New central Book Agency (P) Ltd: Calcutta.

THIRD SEMESTER EXAMINATION

Statistics- Allied Core

STA3IC02– PROBABILITY DISTRIBUTIONS AND PARAMETRIC TESTS

Time: 2 Hours **Max Marks: 60**

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 20.

1. What is meant by a Statistical test? Give an example

2.Write down the test Statistic for testing the equality of means of two normal population whose variance are equal and when the sample sizes are small

3.Distinguish between Null and Alternative hypothesis

4.Give two instances where binomial distribution can be applied

5.What is sampling frame?

6.What is convenience sampling?

7.Define sampling distribution

8. A binomial distribution has n= 500 and p= 0.1. Find the mean and variance of this distribution

9. State central limit theorem

10. Define power of a test

11. What is standard error

12. Write down the p. d. f of standard normal distribution

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 30.

13. What are the main features of Normal distribution

14. If 3% electric bulbs manufactured by a company are defective. Find the probability that in a sample of 100 bulbs, exactly five bulbs are defective (Given $e^{-3} = 0.0492$)

15. Describe Paired sample t test.

16. Distinguish between systematic sampling and stratified sampling.

17. A sample of 25 items were taken from a population with SD 10 and the sample mean is found to be 65. Can it be regarded as a sample from a normal population with mean $\mu=60$. (use $\alpha = 0.05$)

18.The customer accounts at a certain departmental store have an average balance of Rs. 120 and SD of Rs. 40. Assume that the account balance is normally distributed (a) What proportion of the accounts as over Rs. 150 (b) What proportion of accounts in between Rs. 100 and Rs. 150.

19. Sample sizes 10 and 18 taken from two normal population gave standard deviations14 and 20 respectively. Test the hypothesis that the samples have come from population with the same standard deviation at 5% level of significance.

SECTION-C

(Answer any one question and it carries 10 marks)

20. Explain the test procedure for test the equality of variance of two normal populations with known mean.

21. The screws produced by certain machine were checked by examining samples. The following table shows the distribution of 128 sample according to the number of defective items they contained.

No. of defective	0	1	2	3	4	5	6	7	Total
No of samples	7	6	19	35	30	23	7	1	128

Fit a binomial distribution to the data.

SEMESTER 4 - Allied Core

STA4IC02- STATISTICAL TECHNIQUES FOR PSYCHOLOGY

Course Outcome	CO Statement	PO	PSO	Cognitive Level	Class Hours
CO1	To make the students aware of various statistical tests in different areas of Psychology.	1,2,4	4	U, A, Z, E	60
CO2	To provide knowledge of applications of Statistics in different areas of psychological studies.	1	4	U	15
CO3	To provide the basic knowledge of the preparation of Questionnaire.	2,3,4	4	U, A	15

Module 1: Analysis of Variance- assumptions, One-way and Two-way Classification with Single Observation per Cell, Critical Difference. **20 Hours**

Module 2: Non-Parametric tests- Chi-square Test of Goodness of Fit, Test of Independence of Attributes, Test of Homogeneity of Proportions. **20 Hours**

Module 3: Sign Test- Wilcoxon's Signed Rank Test, Wilcoxon's Rank Sum Test, Run Test and Kruskal-Wallis Test. **20 Hours**

Module 4: Factorial Design- Basics of factorial Design, Factorial experiments and their uses in psychological studies, Concepts of 2 2, 23 factorial experiments (without derivation), simple problems. **15 Hours**

Module 5: Preparation of Questionnaire- Scores and Scales of Measurement, Reliability and Validity of Test Scores. **15 Hours**

References

1. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi.
2. Gupta, S.C., &Kapoor, V.K. Fundamentals of Applied Statistics. New Delhi: Sultan Chand and Sons.
3. Garret, H.E., &Woodworth, R.S. Statistics in Psychology and Education. Bombay: Vakila, Feffex and Simens Ltd.

4. Mood, A.M., Graybill, F.A and Boes, D.C. Introduction to Theory of Statistics. 3rd Edition Paperback – International Edition. Douglas C. Montgomery. Design and Analysis of Experiments. 9th Edition.

FOURTH SEMESTER EXAMINATION

Statistics- Allied Core

STA4IC02– STATISTICAL TECHNIQUES FOR PSYCHOLOGY

Time: 2 Hours **Max Marks: 60**

SECTION-A

Each question carries 2 Marks.

Maximum Marks that can be scored in this section is 20

1. What is meant by validity
2. What are contingency tables
3. Write down the test statistic of chi- square test for testing homogeneity
4. What are the advantages of non- parametric test
5. What is meant by Ratio scale
6. State three assumptions of ANOVA technique
7. State the null hypothesis of one-way ANOVA
8. Define the term reliability
9. Write down the test statistic of chi- square test for testing goodness of fit
10. What is meant by interval scale
11. Write any three assumptions associated with non-parametric test
12. What do you mean by pilot survey

SECTION-B

Each question carries 5 Marks.

Maximum Marks that can be scored in this section is 30.

13. What are the steps in preparing a questionnaire?

14. Write a short note on Kruskal-Wallis' test.
15. Describe the importance of factorial experiments in psychological studies.
16. Briefly explain Wilcoxon's Rank sum test.
17. The following are the marks obtained by 10 students in a certain examination

    Marks: 43 48 65 57 31 60 37 48 78 59

    Test the hypothesis that population variance is 100 (Test at 5% level of significance)
18. The following data give the number of lesions on halves of eight tobacco leaves.

Pair number	1	2	3	4	5	6	7	8
Proportion 1, X1	31	20	18	17	9	8	10	7
Proportion 2, X2	18	17	14	11	10	7	5	6

    Use Wilcoxon's signed rank test to test whether the two samples are significantly different.
19. Explain the chi- square test for independence of attributes.

SECTION-C

(Answer any one question and it carries 10 marks)

20. A trucking company wishes to test the average life of each of the three brands of tyres. The company uses all branches on randomly selected trucks. The records showing the lives (thousands of miles) of tyres are as given. Using ANOVA, test the hypothesis that the average life for each brand is the same.

    Brand I - 6 6 2 1

    Brand II - 3 5 5 4

    Brand III - 6 2 3 7
21. (i) Define the term validity (ii) Explain various types of validity.