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UNIVERSITY OF KERALA

FIRST DEGREE PROGRAMME UNDER CBCSS

REVISED SCHEME AND SYLLABI IN OUTCOME-BASED EDUCATION MODE

OF

COMPLEMENTARY STATISTICS FOR BSc PSYCHOLOGY

(with effect from 2022 Admission)

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The goal of the syllabus is that students understand Statistics by using its methods effectively in real life situations. It is aimed that students have experience of the application of statistical methods to analyse data and get acquainted with situations where statistical thinking is helpful. Emphasis is given to practical data collection and use statistical tools to analyse them. Numerical problem solving using scientific calculators is also included in the ESE of courses I, II, III and IV. ESE of Courses I, II, III & IV will be of 3 hours duration and have questions from all modules. Courses I & II will be of 2 credits each and Courses III & IV will be of 3 credits each.

Course Structure:

Sem	Title of the Course	Hrs/Week L	No. of Credits	Total Hrs/Sem	ESE Duration	Evaluation weightage	
						CE	ESE
I	ST1131.5: Statistical Methods for Psychology I	3	2	54	3hrs	20%	80%
II	ST1231.5:Statistical Methods for Psychology II	3	2	54	3hrs	20%	80%
III	ST1331.5:Statistical Methods for Psychology III	3	3	54	3hrs	20%	80%
IV	ST1431.5:Statistical Methods for Psychology IV	3	3	54	3hrs	20%	80%

COURSE CODE: ST 1131.5

COURSE TITLE: STATISTICAL METHODS FOR PSYCHOLOGY I

Course outcomes:

On completion of the course, the students should be able to:

CO.1: Explain the importance and functions of Statistics.

CO.2: Explain the concept of linear equations, ratios and theory of indices

CO.3: Describe different variables of measurements and scaling techniques.

CO.4: Explain different data types - primary and secondary data, different methods of primary data collection.

CO.5: Explain the concept of census and sampling, different sampling techniques.

CO.6: Design questionnaires and carry out surveys.

CO.7: Describe different methods of classification of data and present raw data using frequency tables as well as appropriate diagrams and graphs

Sl. No:	Outcomes On completion of each module, students should be able to:	Taxonomy Level
MODULE 1	MO1.1 Describe meaning, importance and functions of Statistics.	Understand
	MO 1.2 Discuss the concept of linear equations, theory of indices and ratios	Understand
	MO 1.3 Describe different variables of measurements - qualitative, quantitative, discrete and continuous	Understand
	MO 1.4 Define different scaling techniques-nominal, ordinal, interval and ratio scales	Remember
	MO 2.1 Explain different data types - primary and secondary data and distinguish between the two.	Understand

MODULE 2	MO 2.2 Describe different methods of collecting primary data.	Understand
	MO 2.3 Explain sources of secondary data, precaution in the use of secondary data.	Understand
	MO 2.4 Prepare questionnaire and test reliability, validity and objectivity of it.	Apply
MODULE 3	MO 3.1 Compare census and sampling methods	Understand
	MO 3.2 Explain advantages of sampling over census	Understand
	MO 3.3 Distinguish between random and non-random sampling methods	Understand
	MO3.4 Define simple random sampling, stratified sampling, systematic sampling, multi- stage sampling and cluster sampling	Remember
	MO 3.5 Explain merits and demerits of different sampling models.	Understand
MODULE 4	MO 4.1 Describe different methods of classification	Understand
	MO 4.2 Prepare discrete and continuous frequency tables	Apply
	MO 4.3 Define class limits, class boundaries and class mark.	Remember
	MO4.4 Prepare cumulative frequency tables and cumulative percentage frequency tables	Apply
MODULE 5	MO 5.1 Explain different diagrammatic representations of data like one-dimensional, two-dimensional, three-dimensional, pictograms and cartograms	Understand
	MO 5.2 Sketch different diagrams like bar diagrams, pie diagrams	Apply
	MO 5.3 Visualise frequency distributions using histogram, frequency polygon, frequency curves and ogives.	Apply

Course Content

Module I

Meaning of Statistics, Functions of Statistics, Need and Importance of Statistics in Psychology. Limitations of Statistics.

Prerequisites for studying Statistics - Essential Mathematical fundamentals - solving linear equations, Theory of indices, Ratios.

Types of variables employed in measurements – discrete and continuous variable, quantitative variables. Scale of measurement Nominal scale, Ordinal scale, Interval scale, Ratio scale with suitable examples from Psychological data.

Module II

 Collection of Data: Primary data and secondary data, Choice between primary and secondary data. Methods of collecting primary data, merits and demerits of different methods of collecting primary data, Sources of secondary data, Precaution in the use of secondary data. Testing reliability, validity and objectivity of questionnaire.

Module III

Census and sampling method. Methods of sampling – Random sampling and Non-random sampling, Stratified sampling, systematic sampling, Multi stage sampling, Cluster sampling. Selection of appropriate sampling method, Merits and demerits of different sampling methods.

Module IV

 Classification and Tabulation: Meaning and objective of classification, Type of classification- geographical classification,Chronological classification, quantitative classification .

Tabulation of data, Formation of discrete and continuous frequency distribution. Class limits, class boundaries, class mark, raw data, ungrouped and grouped data. Cumulative frequencydistribution, cumulative percentage frequency distribution

Module V

Diagrammatic Representations - Bar diagrams, types of Bar diagrams, Pie diagram, Pictograms and cartograms. Graphical representations: Histogram, Frequency polygon, frequency curve, Ogives.

References:

1. Aron A, Aron R & Coups E J (2006). *Statistics for Psychology* (4[th]ed), Pearson Education, New Delhi .

2. Garret E Henry (2004). *Statistics in Psychology and Education* (11[th]ed), Paragon International Publishers, New Delhi.

3. Gravetter, F J & Wallnau L B (2000). *Statistics for Behavioral Science* (5[th]ed), Wadsworth-Thomson learning Singapore

4. Heiman W Carry (2000). *Basic Statistics for Behavioral Science* (3rd ed.), Houghton Mifflin Company, New York

5. Mangal S K (2000). *Statistics in Psychology and Education* (2nd ed.), Prentice_Hall of India Private Limited, New Delhi

6. Minium W Edward, King M Bruce & Bear Gardon (2001). *Statistical Reasoning in Psychology and Education* (3[rd]ed),John Wiley & Sons ,New York

7. Yule Undy G & Kendal M G (1991). *An Introduction to Theory of Statistics* (14[th]ed.) Universal Book Stall, New Delhi.

SEMESTER: II
COURSE CODE: ST 1231.5
COURSE TITLE: STATISTICAL METHODS FOR PSYCHOLOGY II

Course outcomes

On completion of the course, the students should be able to:

CO.1: Explain central tendency and properties of good averages

CO.2: Calculate mean, median and mode

CO. 3: Identify median and mode graphically

CO. 4: Calculate percentiles, percentile ranks, quartiles and deciles

CO. 5: Calculate Range, Mean deviation, Quartile deviation and standard deviation.

CO. 6: Compare different measures of variability.

CO. 7: Calculate Karl Pearson's measure of skewness, Bowley's coefficient of skewness and measure of kurtosis.

CO. 8: Calculate probabilities associated with simple numerical problems using classical definition and addition theorem of probability.

Sl. No:	Outcomes On completion of each module, students should be able to:	Taxonomy Level
Module 1	MO 1.1 Explain central tendency MO 1.2 Explain the properties of a good average MO 1.3 Calculate arithmetic mean, median and mode. MO 1.4 Determine median and mode graphically	Understand Understand Apply Apply
Module 2	MO 2.1 Calculate percentiles, percentile rank MO 2.2 Calculate quartiles and deciles	Apply Apply
Module 3	MO 3.1 Explain variability MO 3.2 Explain properties of a good measure of variability MO 3.3 Calculate Range, Mean deviation, Quartile deviation and standard deviation MO 3.4 Compare different measures of variability. MO 3.5 Calculate coefficient of range, coefficient of quartile deviation and coefficient of variation	Understand Understand Apply Analyse Apply
Module 4	MO 4.1 Explain Skewness and Kurtosis. MO 4.2. Calculate Karl Pearson's measure of skewness, Bowley's coefficient of skewness and measures of kurtosis for raw data (Moment measures of skewness and kurtosis not required)	Understand Apply
	MO 5.1 Explain concepts of set theory and set operations MO 5.2 Explain elementary concepts of probability, random	Understand

	experiment, sample space and events.	Understand
Module 5	MO 5.3 Make use of classical definition of probability and addition theorem (2 events) to calculate probabilities associated with simple numerical problems	Apply

Course content

MODULE I

Meaning and importance of measures of central tendency, Properties of a good average, simple arithmetic mean, mean and weighted mean, arithmetic mean, computation of arithmetic mean for raw, ungrouped and grouped data. Computation of median from raw, ungrouped and grouped data. Computation of mode from raw, ungrouped and grouped data. Graphical determination of median and mode, when to use mean, median and mode.

MODULE II

Percentiles, quartiles and deciles. Computation of percentiles, quartiles and deciles. Percentile rank: definition, computation and utility of percentile and percentile rank.

MODULE III

Meaning and importance the measure of variability, properties of good measure of variability. Range, Mean deviation, Quartile deviation, standard deviation: computation and use. Comparison of different measures of variability. Relative measure of variation-coefficient of range, coefficient of quartile deviation, coefficient of variation, computation and use, when to use various measures of variability.

MODULE IV

Skewness – definition, measures of skewness – Karl Pearson's coefficient of skewness, Bowley's coefficient of skewness. Kurtosis, measures of kurtosis. Simple numerical problems for raw data only. (Moment measures of skewness and kurtosis not required).

MODULE V

Basic concepts of set theory, set operations, probability – random experiment, sample space, event, different types of events. Classical and frequency definition of probability. Addition theorem, independent of events, simple problems.

References:

1. Aron A, Aron R & Coups E J (2006). *Statistics for Psychology* (4thed), Pearson Education, New Delhi .

2. Garret E Henry (2004). *Statistics in Psychology and Education* (11thed), Paragon International Publishers, New Delhi.

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7. Yule Undy G & Kendal M G (1991). *An Introduction to Theory of Statistics* (14thed.) Universal Book Stall, New Delhi.

SEMESTER: III

COURSE CODE: ST 1331.5

COURSE TITLE: STATISTICAL METHODS FOR PSYCHOLOGY III

Course outcomes

On completion of the course, the students should be able to:

CO.1: Explain the concept of correlation anddifferent methods of finding correlation like scatter diagram, correlation coefficient.

CO.2: Describe properties of correlation coefficient and solve numerical problems.

CO.3: Describe concept of regression analysis, properties of regression coefficients

CO.4: Explain the concept of association, dissociation and independence of attributes.

CO.5: Describe the concept of random variables-both discrete and continuous, basic concepts and definitions of probability density function and distribution function.

CO.6: Define standard distributions - Binomial and Poisson distributions and derive mean and variance

CO.7: Explain normal probability curve and its characteristics .

CO.8: Compare standard scores like z-score, t-score and stanine score.

Sl. No:	Outcomes On completion of each module, students should be able to:	Taxonomy Level
MODULE 1	MO1.1 Describe the significance of correlation. MO 1.2 Define different types of correlation like linear, non-linear, direct, inverse. MO 1.3Explain correlation using scatter diagram MO 1.4 Define Pearson's correlation coefficient and describe its properties. MO 1.5Calculate Pearson's correlation coefficient and Spearman's rank correlation coefficient	Understand Remember Understand Understand Apply
MODULE 2	MO 2.1 Explain the concept of regression equations. MO 2.2 Derive angle between regression lines. MO 2.3 Describe properties of regression coefficients. MO 2.4 Derive relation between correlation coefficient and regression coefficients MO 2.5 Explain regression and prediction	Understand Understand Understand Apply Apply
MODULE 3	MO 3.1 Describe the concept of association, dissociation , independence of attributes and consistency of data MO 3.2 Compare correlation and association MO 3.3 Describe different methods of studying association like coefficient of association and coefficient of colligation MO 3.4 Solve simple numerical problems on association	Understand Understand Understand Apply
	MO 4.1 Define random variables-discrete and continuous	Remember

	MO 4.2 Explain the concept and properties of probability density function and distribution function.	Understand
MODULE 4	MO 4.3Solve simple problems of discrete random variables	Apply
	MO 4.4 Define Binomial and Poisson distributions.	Remember
	MO 4.5 Derive mean and variance of Binomial and Poisson distributions	Understand
	MO 4.6 Solve simple numerical problems of Binomial and Poisson distributions	Apply
MODULE 5	MO 5.1 Define Normal curve in terms of skewness and kurtosis	Remember
	MO 5.2 Describe the characteristics of normal curve	Understand
	MO 5.3 Solve numerical problems using Normal tables.	Apply
	MO 5.4 Define standard errors of measurement.	Remember
	MO5.5 Define Standard scores – Z-score, T-Score, Stanine score. .	Remember

Course content

Module I

Correlation Analysis - Significance of the study of correlation, Types of correlation- Linear, Nonlinear correlation, Direct and inverse. Methods of studying correlation: Scatter diagram method, Karl Pearson's coefficient of correlation, Properties of coefficient of correlation, Spearman's rank correlation coefficient (No derivations). Numerical problems

Module II

Significance of the study of regression, difference between correlation and regression analysis. Regression equations - Regression equation of Y on X, Regression equation of X on Y. Regression coefficients, Properties of regression coefficients, Relation between correlation coefficient and regression coefficients. Regression and prediction.

Module III

Difference between Correlation and Association, Consistency of data, Association and Disassociation, Methods of studying Association: Yule's coefficient of association, Coefficient of colligation. Simple numerical problems

Module IV

Random variable, Discrete and continuous random variable, Probability mass function, probability density function, Probability Distributions- Basic concepts, definitions and properties. Problems on discrete random variables. Standard distributions: Binomial, Poisson-definition, Derivation of mean and variance only. simple problems.

Module V

Normal curve – in terms of skewness and kurtosis, Characteristics and applications. Use of the table of Normal curve, Examples of applications of the normal curve. Concept of standard errors of measurement. Standard scores – Z-score, T-Score, Stanine score, Converting raw scores into comparable standard normalized scores.

References:

1. Aron A, Aron R & Coups E J (2006). *Statistics for Psychology* (4th ed), Pearson Education, New Delhi .

2. Garret E Henry (2004). *Statistics in Psychology and Education* (11th ed), Paragon International Publishers, New Delhi.

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7. Yule Undy G & Kendal M G (1991). *An Introduction to Theory of Statistics* (14th ed.) Universal Book Stall, New Delhi.

SEMESTER: IV
COURSE CODE: ST 1431.5
COURSE TITLE: STATISTICAL METHODS FOR PSYCHOLOGY IV

Course outcomes

On completion of the course, the students should be able to:

CO.1: Define parameter, statistic, standard error, sampling distributions.

CO.2: Explain chi-square, student's-t and F-statistics and inter relationship between chi-square, t and F distributions.

CO. 3: Make use of tables of student's t, chi square and F distributions.

CO. 4: Calculate interval estimators for mean of normal population

CO. 5: Calculate interval estimators in numerical problems associated with mean of Normal distribution.

CO. 6: Carry out some parametric and non parametric tests of hypothesis.

MODULE OUTCOME

SL. NO	Outcomes On completion of each module, students should be able to:	Taxonomy Level
Module 1	MO 1.1 Define parameter, statistic, standard error, sampling distributions, Standard error of sample mean	Remember
	MO 1.2 Explain chi-square, student's-t and F-statistics and inter relationship between chi-square, t and F distributions.	Understand
	MO 1.3 Make use of tables of chi square t and F distributions.	Apply
	MO 1.4 Explain basic concepts of point and interval estimation	Understand
	MO 1.5 Calculate interval estimators in numerical problems associated with mean of Normal distribution.	Apply
Module 2	MO 2.1 Explain the basic concepts of testing of statistical hypothesis	Understand
	MO 2.2 Calculate size and power of test in simple problems on discrete cases.	Apply
Module 3	MO 3.1 Carry out large sample tests of significance of mean, proportion, difference between two means and difference between two proportions.	Apply
	MO 3.2 Carry out chi square tests of independence of attributes and goodness of fit.	Apply

	MO 3.3 Define coefficient of contingency	Remember
Module 4	MO 4.1 Carry out small sample tests of the significance of mean and difference between two means in normal population(s)	Apply
	MO 4.2 Carry out paired t test	Apply
	MO 4.3 Carry out test for significance of correlation coefficient.	Apply
Module 5	MO 5.1 Explain non- parametric tests	Understand
	MO 5.2 Carry out sign test, Wilcoxon's matched pair signed rank test, Wald-Wolfowitz run test, Mc-Nemar test	Apply

Course content

Module I

Statistical inference: Parameter, statistic, standard error, sampling distributions, sampling distribution of sample mean (without proof), chi-square, student's-t, F-statistics-definitions, inter relationship between chi-square, t and F statistics, Estimation theory-point and interval estimation (basic concepts, definition only), interval estimation problems based on Normal and t distributions.

Module II

Testing of hypothesis: Procedure of testing of hypothesis, Null and alternative hypothesis, Two types of errors, significance level, power of test, P value, Two tailed and one tailed tests of significance, simple problem on discrete case only.

Module III

Large sample tests: testing the significance of mean, testing the significance of difference between two means, testing significance of proportion, testing significance of difference between two proportions. Chi-square tests- testing independence of attributes, coefficient of contingency, testing of goodness of fit.

Module IV

Small sample tests: testing the significance of mean of normal distribution, testing the significance of difference between means of two normal populations, paired-t tests, testing correlation coefficient.

Module V

Non- parametric tests: when to use parametric and non- parametric tests, Sign test,Wilcoxon's matched pair signed rank test, Wald-Wolfowitz Run test, Mc-Nemer test, Simple problems (for problems table value to be provided in the question paper).

References:

1. Aron A, Aron R & Coups E J (2006). *Statistics for Psychology* (4th ed), Pearson Education, New Delhi .

2. Garret E Henry (2004). *Statistics in Psychology and Education* (11th ed), Paragon International Publishers, New Delhi.

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