



KARNATAK UNIVERSITY, DHARWAD

Ref. No. No. KU/(Aca(S&T))/(PPK-91)/Stat/UG /2015-16/ 921

Date: 6/05/2015

NOTIFICATION

Sub: Regarding revision of syllabus of Statistics for B.A./B.Sc., I, II and III semester (Optional) papers with effect from Academic Year 2015-16 & onwards.

Ref: 1) BOS in Statistics (UG) Res. No. 7 dated: 23-09-2014

2) Science Faculty, Res.No. 1 Dated: 03-03-2015

3) Academic Council Res.No.15, dt: 23-03-2015.

4) Hon'ble Vice-Chancellors order dt: 29-04-2015

Adverting to the above, it is hereby informed to the Principals of all the affiliated and constituent Arts and Science Degree Colleges, coming under the jurisdiction of Karnatak University, Dharwad that the syllabus of Statistics for B.A./B.Sc., I, II and III semester (Optional) papers are revised with effect from the Academic year 2015-16 & onwards.

Hence, the contents of this notification may please be brought to the notice of the students and all concerned.

The concerned syllabus may also be obtained through the Karnatak University **Website:** www.kud.ac.in. (Academic Folder)

REGISTRAR

Copy F.W.Cs. to,

Dr. S.T. Nandibewoor, Dean, Faculty of Science & Technology, Professor, PG Dept. of Studies in Chemistry, K.U. Dharwad for information.

To,

1. All the Principals of the Affiliated and Constituent Arts and Science Degree Colleges coming under the jurisdiction of the K.U.Dharwad.
2. Dr. S.B. Munoli,(Chairman BOS, UG), Chairperson, PG Department of Studies in Statistics, K.U.Dharwad
3. The Director, IT Section, K.U. Dharwad for information and with request to put it on the University website www.kud.ac.in (Academic Folder)

Copy to :

1. P.S. to Vice-Chancellor, K.U. Dharwad.
2. S.A. to Registrar, K.U. Dharwad.
3. O.S., Academic(Affiliation) Section, K.U. Dharwad.
4. O.S., Exam (UG Branch) Section, K.U. Dharwad.
5. O.S., Exam (Confdl) Section, K.U. Dharwad.
6. O.S., Exam (QP) Section, K.U. Dharwad.
7. O.S., Exam (GAD) Section, K.U. Dharwad.
8. O.S., CDC Section, K.U. Dharwad.
9. Computer Unit Exam. Section, K.U. Dharwad.
10. Office File

KARNATAK UNIVERSITY, DHARWAD

DEPARTMENT OF STATISTICS

Revised syllabi of Optional Statistics for B.A. / B.Sc. I Semester Course with
effect from academic year 2015 -2016 onwards

STATISTICS (OPTIONAL)

B.A. / B.Sc. COURSE IN STATISTICS

FIRST SEMESTER THEORY PAPER

**STTH: 1 BASIC STATISTICS, PROBABILITY & MATHEMATICAL
EXPECTATION**

Unit I: Introduction: Introduction, meaning, definition, functions, limitations, scope of statistics, variable, attribute, qualitative and quantitative data, types of data & scales of measurement (nominal, ordinal, interval, ratio, cross sectional, time series etc.), Formation of a uni-variate and bi-variate frequency distribution, marginal and conditional distributions, Graphical presentation of a frequency distribution.

(10 Hours)

Unit II: Descriptive Statistics:

Measures of central tendency – Arithmetic mean, Geometric mean, Harmonic mean, Median & Mode. Definition, formulae, properties, merits and demerits, Measures of partition values – Quartiles, Deciles & Percentiles, definition, formulae, Measures of dispersion – Absolute & relative measures, Range, Quartile Deviation, Mean Deviation and Standard Deviation, definition, formulae, properties, merits and demerits, Measures of Skewness: Meaning, need, types of skewness, absolute and relative measures, properties, Measures of Kurtosis: Need, types of kurtosis, measurement of kurtosis, properties, standard theoretical examples. Moments about origin, moments about mean, their interrelationships, and properties.

(20 Hours)

Unit III: Probability Theory: Basic concepts: Random experiment, Sample space, Mutually exclusive, exhaustive, equally likely events, complimentary events, classical,

statistical and axiomatic definition of probability, properties, Addition and Multiplication, Conditional probability theorems with proofs, theoretical examples, With replacement and without replacement selection, Independent and dependent events, Bayes' theorem and its applications.

(12 Hours)

Unit IV: Random Variables & Mathematical Expectations: Definition of a random variable, discrete & continuous, probability mass function, probability density function, distribution function and its properties, idea of marginal, conditional distributions, joint probability functions, independence of random variables. Mathematical expectation of a random variable. Addition theorem and Multiplication theorems on mathematical expectations. Generalization of Addition theorem and Multiplication theorems on random variables, Variance, Covariance, and Variance of linear combinations of random variables.

(10 Hours)

Unit V: Generating functions and their applications: Moment generating functions, cumulants generating functions, probability generating functions, and its applications, properties of MGF, Chebyshev's inequality and its applications, Weak Law of Large Numbers. Determination of moments with MGF & CGF.

(8Hours)

LIST OF PRACTICALS FOR FIRST SEMESTER

STTH: 1 BASIC STATISTICS, PROBABILITY & MATHEMATICAL EXPECTATION

1. Formation of a frequency distribution uni-variate and bi-variate etc.
2. Graphical presentation of a frequency distribution
3. Measures of Central Tendency – I & II
4. Partition values
5. Measures of Dispersion – I & II
6. Measures of Skewness and Kurtosis
7. Probability – I & II

8. Exercise on Mathematical Expectation.
9. Exercise on Moments.

Demonstration of practicals using MS Excel, R-Programming, & SPSS.

Books for Study:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Kalyan Kumar Mukherjee: Probability and Statistics, New Central Book Agency (P) Ltd., Calcutta.
3. Bansilal & Arora, S.R.: Mathematics of Probability & Statistics, R. Chand & Co., New Delhi.
4. Chatterji, P.N.: Mathematical Statistics, Rajhans Prakashana Mandir, Educational Publishers, Meerut.
5. Ray & Sharma: Mathematical Statistics, Ram Prasad & Sons, Agra.
6. Dr. Goel, B.S., Prof. Satyaprakash and Dr. Roshan Lal: Mathematical Statistics, Pragati Prakashana, Meerut.

Books for reference:

7. Robert V. Hogg and Allen T. Craig: Introduction to Mathematical Statistics (Fifth Edition), Pearson Education Inc, New Delhi.
8. Goon, A.M., Gupta, M.K. and Dasgupta, B.: Fundamentals of Statistics Volume I and II. The World Press Private Limited, Calcutta.
9. Mathai, A.M.: Introduction to Statistical Methods, MacMillan Company Ltd.,
10. Lindgren: Introduction to Probability & Statistics, MacMillan Publishers.
11. Rohatgi, V.K.: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi.
12. Parzen: Modern Probability Theory & its Applications, Wiley Eastern.
13. A.M. Mood and Graybill: Introduction to the theory of Statistics.

KARNATAK UNIVERSITY, DHARWAD

DEPARTMENT OF STATISTICS

Revised syllabi of Optional Statistics for B.A. / B.Sc. II Semester Course with effect from academic year 2013 -2014 onwards.

STATISTICS (OPTIONAL)

B.A. / B.Sc. COURSE IN STATISTICS

SECOND SEMESTER THEORY PAPER

**STTH: 2 CORRELATION & REGRESSION, PROBABILITY DISTRIBUTIONS,
ORDER STATISTICS.**

Unit I: Correlation and Regression: Definition, Types of correlation, Methods of measuring correlation, Scatter diagram, Prof. Karl Pearson's coefficient of linear correlation, its properties, Spearman's rank correlation coefficient, its properties, Kendall's correlation coefficient, Regression coefficients and Line of regressions, its properties Angle between two regression lines. Simple theoretical examples on correlation.

(12 Hours)

Unit II: Multiple & Partial Correlation and Regression: Idea of a tri-variate distribution, Yule's notations, Plane of regression and its derivation, Multiple and Partial correlation, Definition, derivation, and their standard properties. Properties of residuals, residual variance. Simple theoretical examples associated with tri-variate distributions.

(12 Hours)

Unit III: Standard discrete distributions: Uniform, Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, Hyper geometric distributions, definition, mean, variance, moments, moment generating functions, recurrence relation for probabilities and moments for binomial, Poisson, and Negative binomial distributions, additive property,. Cumulant generating function, theoretical examples. Standard examples on probability distributions and transformation of variables.

(15 Hours)

Unit IV: Standard Uni-variate continuous distributions: Rectangular, Beta, Gamma, and Exponential distributions, definitions through p.d.f's, Mean, variance, moments, cumulants recurrence relations, Additive property of exponential and gamma variates, Normal distribution and its properties, Cauchy distribution, Uni-variate and Bi-variate transformation of variables of discrete and continuous random variables.

(15Hours)

Unit V: Order statistics: Definition of ordered statistic and their distributions, Derivation of first order statistic, highest order statistic, r^{th} order statistics, joint distribution of order statistics and their derivations, simple examples to obtain the distributions of order statistics.

(06 Hours)

LIST OF PRACTICALS FOR SECOND SEMESTER

STTH: 2 PROBABILITY DISTRIBUTIONS, CORRELATION & REGRESSION, TIME SERIES

1. Correlation and Regression for two variables: ungrouped and grouped
2. Rank Correlation: Spearman & Kendall
3. Multiple and Partial correlation:
4. Plane of regression.
5. Fitting of Binomial distribution.
6. Fitting of Poisson distribution
7. Fitting of Negative binomial distribution.
8. Exercise on computation of probabilities using discrete distributions.
9. Examples on probability calculations on normal distribution and use of standard normal tables.
10. Fitting of normal distribution.

Demonstration of practicals using MS Excel, R-Programming, & SPSS.

Books for Study and Reference:

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Kalyan Kumar Mukherjee: Probability and Statistics, New Central Book Agency (P) Ltd., Calcutta.
3. Bansilal & Arora, S.R.: Mathematics of Probability & Statistics, R. Chand & Co., New Delhi.
4. Chatterji, P.N.: Mathematical Statistics, Rajhans Prakashana Mandir, Educational Publishers, Meerut.
5. Ray & Sharma: Mathematical Statistics, Ram Prasad & Sons, Agra.
6. Dr. Goel, B.S., Prof. Satyaprakash and Dr. Roshan Lal: Mathematical Statistics, Pragati Prakashana, Meerut.

Books for reference:

1. Robert V. Hogg and Allen T. Craig: Introduction to Mathematical Statistics (Fifth Edition), Pearson Education Inc, New Delhi.
2. Rohatgi, V.K.: An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi.
3. Lindgren: Introduction to Probability & Statistics, MacMillan Publishers.
4. Parzen: Modern Probability Theory & its Applications, Wiley Eastern.
5. A.M. Mood and Graybill: Introduction to the theory of Statistics.
6. Mathai, A.M.: Introduction to Statistical Methods, MacMillan Company Ltd, India.

KARNATAK UNIVERSITY, DHARWAD

DEPARTMENT OF STATISTICS

Revised syllabi of Optional Statistics for B.A. / B.Sc. III Semester Course with effect from academic year 2014 -2015 onwards.

STATISTICS (OPTIONAL)

B.A. / B.Sc. COURSE IN STATISTICS

THIRD SEMESTER THEORY PAPER

STTH: 3: EXACT SAMPLING DISTRIBUTIONS & THEORY OF ESTIMATION

Unit I: Sampling distribution: Basic concepts – Population, Sample, Parameter, Statistic. Definition of a Random Sample, Sampling distribution of a Statistic and its standard Error. Statement of Central limit theorem: Laplace, De-Moivre – Laplace, Liapounoff. Derivation of Lindeberg & Levy Central Limit Theorem by MGF method, Simple examples. Verification of CLT for Binomial and Poisson distribution.

(05 Hours)

Unit – II: Chi-Square Sampling Distribution:

Chi-square Distribution: Definition, Derivation of Chi-distribution by Moment Generating Function method, Properties, Moments, Recurrence relation for moments about origin and mean, cumulant generating function limiting form of Chi-distribution. Independence of sample mean and sample variance in random sampling from a normal distribution, Theoretical examples. Cumulant generating function, Distributions of

$\frac{1}{2}\chi^2$, $\frac{\chi^2_1}{\chi^2_2}$, $\frac{\chi^2_1}{(\chi^2_1 + \chi^2_2)}$ and other standard examples of transformations.

(10 hours)

Unit – III: Sampling distributions of t and F:

Definition of students t – variate and Fisher's t – variate, Derivation of students t – distribution, Moments and Recurrence relation for t – distribution, Limiting form of t – distribution, Theoretical examples. Snedecor's F – distribution: Definition, Derivation of F - distribution, Properties, Moments and recurrence relation for moments, Inter

relationship between t, F and χ^2 distributions, Theoretical examples. Mean deviation about mean for students – t distribution, students’- t as a particular case of Fisher’s – t, Limiting form of F- distribution.

(15 hours)

Unit – IV: Point Estimation:

Concepts of the terms: Parameter, Estimator, Estimate and Standard Error of an estimator. Unbiasedness, Mean squared error as a criterion for comparing estimators. Relative efficiency, Most efficient estimator, Minimum variance unbiased estimator (MVUE). Consistency: Definition and criteria for consistency. Proof of Sufficient condition for consistency using Chebyshev’s inequality. Sufficient statistic, Fisher – Neyman criterion and Neyman – Factorization theorem (without proof), Measure of information – Fisher information function. Cramer – Rao inequality (with proof) and its applications in the construction of minimum variance unbiased estimators. Methods of Estimation: Maximum Likelihood and Moment estimation methods. Standard examples from theoretical distributions, Illustration for non uniqueness of MLE’s. Properties of ML Estimator and MM Estimator. Examples illustrating properties of MLE.

(20 hours)

Unit – V: Interval Estimation:

Meaning of confidence interval and pivotal quantity, Confidence interval based on pivotal quantity. Confidence coefficient. Confidence intervals for mean, difference between means for large and small samples, Confidence intervals for variance and ratio of variances under normality. Large sample confidence intervals for a proportion and difference between two proportions. Confidence Intervals using MLE in case of large samples.

(10 hours)

LIST OF PRACTICALS FOR THIRD SEMESTER

**STTH: 3: SAMPLING DISTRIBUTION, TEST OF SIGNIFICANCE &
CONFIDENCE INTERVAL**

1. Computation of mean square errors of estimators and comparison.

2. Maximum Likelihood Estimation – I
3. Maximum Likelihood Estimation – II
4. Method of Moment Estimation.
5. Confidence Intervals – I
6. Confidence Intervals – II
7. Confidence Intervals – III

Demonstration of practicals using MS Excel, R-Programming, & SPSS.

Books for Study:

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6. Goon, A.M., Gupta, M.K. and Dasgupta, B.: Fundamentals of Statistics Volume I and II. The World Press Private Limited, Calcutta.

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