Deccan Education Society's
FERGUSSON COLLEGE, PUNE
(AUTONOMOUS)

SYLLABUS UNDER AUTONOMY

FIRST YEAR B.A.
SEMESTER - I

SYLLABUS FOR F.Y.B.A. (APPLIED STATISTICS)

Academic Year 2016-2017

FERGUSSON COLLEGE (AUTONOMOUS), PUNE
DEPARTMENT OF STATISTICS

Course Structure for F.Y. B.A. Applied Statistics

Semester	Subject Code	Title of Paper	No. of Credits
Semester –I	STA1101	Descriptive Statistics - I	2
Semester- II	STA1201	Descriptive Statistics - II	2

PAPER CODE: STA1101
PAPER – I: Descriptive Statistics - I
[Credit -3: No. of Lectures 48]
Objectives: The main objective of this course is to acquaint students with some basic concepts in Statistics. They will be introduced to some elementary statistical methods of analysis of data. At the end of this course students are expected to be able,

(i) to compute various measures of central tendency, dispersion, skewness and kurtosis.
(ii) to analyze data pertaining to attributes and to interpret the results.
(iii) to compute the correlation coefficient for bivariate data and interpret it.
(iv) to fit linear, quadratic and exponential curves to the bivariate data to investigate relation between two variables.
(v) to fit linear regression model to the bivariate data
(vi) to compute and interpret various index numbers.

	Title and Contents	**No. of Lectures**
Unit - I	1. **Introduction to Statistics** 1.1 Meaning of Statistics as a Science. 1.2 Importance of Statistics. 1.3 Scope of Statistics: In the field of Industry, , Economics, Social Sciences, Management sciences, Agriculture, Insurance, Information technology, Education and Psychology Biological sciences, Medical sciences. 1.4 Statistical organizations in India and their functions: CSO, ISI, NSS, IIPS (Devnar, Mumbai), Bureau of Economics and Statistics.	**4**
Unit - II	2. **Population and Sample** 2.1 Types of characteristics: Attributes: Nominal scale, Ordinal scale, Variables: Interval scale, Ratio scale, discrete and continuous variables, difference between linear scale and circular scale 2.1 Types of data: (a) Primary data, Secondary data (b) Cross-sectional data, time series data. 2.2 Notion of a statistical population: finite population, infinite population, homogeneous population and heterogeneous population. Notion of a sample and a random sample 2.4 Methods of sampling (description only): Simple random	**6**

	sampling with and without replacement (SRSWR and SRSWOR), stratified random sampling, systematic sampling, cluster sampling and two-stage sampling.	
Unit - III	3 **Summary Statistics.** Review / Revision of Presentation of Data 3.1 Classification: Raw data and its classification, ungrouped frequency distribution, Sturges' rule, grouped frequency distribution, cumulative frequency distribution, inclusive and exclusive methods of classification, Open end classes, and relative frequency distribution. 3.2 Measures of Central Tendency Review / Revision of following topics: Concept of central tendency of statistical data, Statistical averages, characteristics of a good statistical average. Arithmetic Mean (A.M.): Definition, effect of change of origin and scale, combined mean of a number of groups, merits and demerits, trimmed arithmetic mean, mode and median: Definition, formulae, merits and demerits. Empirical relation between mean, median and mode . Partition Values: Quartiles, Deciles and Percentiles, Box Plot. Geometric Mean (G.M.): Definition, formula, merits and demerits. Harmonic Mean (H.M.): Definition. Formula, merits and demerits. Orderly relation between arithmetic mean, geometric mean, harmonic mean Weighted Mean: weighted A.M., G.M. and H.M. Situations where one kind of average is preferable to others. 3.3 Measures of Dispersion Review / Revision of following topics: Concept of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range (Quartile	**16**

	deviation):	
	Definition, merits and demerits,	
	Mean deviation,	
	Definition, merits and demerits, minimality property	
	(without proof),	
	Variance and standard deviation:	
	Definition, merits and demerits, effect of change of origin and scale, combined variance for n groups (derivation for two groups).	
	Mean squared deviation: Definition, minimality	
	property of mean squared deviation (without proof),	
	Measures of dispersion for comparison: coefficient of \	
	range, coefficient of quartile deviation and coefficient of	
	mean deviation, coefficient of variation (C.V.)	
Unit - IV	4 **Moments, Skewness and Kurtosis**	
	4.1 Raw moments (m'_r) for ungrouped and grouped data.	
	4.2 Central moments (m_r) for ungrouped and grouped data, Effect of change of origin and scale.	**10**
	4.3 Relations between central moments and raw moments, upto 4th order (without proof).	
	4.4 Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequency distribution.	
	4.5 Bowley's coefficient of skewness : Bowley's coefficient of skewness lies between -1 to 1 (with proof), interpretation using Box plot.	
	4.6 Karl Pearson's coefficient of skewness.	
	4.7 Measures of skewness based on moments $(\beta 1, \gamma 1)$.	
	4.8 Concepts of kurtosis, leptokurtic, mesokurtic and platykurtic frequency distributions.	
	4.9 Measures of kurtosis based on moments $(\beta 2, \gamma 2)$.	
Unit - V	5 **Index Numbers**	
	5.1 Introduction.	
	5.2 Definition and Meaning.	
	5.3 Problems / considerations in the construction of index numbers.	**12**
	5.4 Simple and weighted price index numbers based on price	
	relatives.	
	5.5 Simple and weighted price index numbers based on aggregates.	
	5.6 Laspeyre's, Paasche's and Fisher's Index numbers.	

| | 5.7 Consumer price index number: Considerations in its construction. Methods of construction of consumer price index number - (i) family budget method (ii) aggregate expenditure method.
5.8 Shifting of base, splicing, deflating, purchasing power.
5.9 Description of the BSE sensitivity and similar index numbers. | |

References:
1. Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi.
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.
3. Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical Statistics, Eighth Edition, Sultan Chand and Sons Publishers, New Delhi.
4. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third Edition, Sultan Chand and Sons Publishers, New Delhi.
5. Freund, J. E. (1977). Modern Elementary Statistics. Fourth Edition, Prentice Hall of India Private Limited, New Delhi.
6. Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentce Hall of India, New Delhi.
7. Snedecor G. W. and Cochran W. G.(1989). Statistical Methods, Eighth Ed. East-West Press.

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FIRST YEAR B.A.
SEMESTER - II

SYLLABUS FOR F.Y.B.A. (APPLIED STATISTICS)

Academic Year 2016-2017

PAPER CODE: STA1201
PAPER – I: Descriptive Statistics - II
[Credit -3: No. of Lectures 48]

	Title and Contents	**No. of Lectures**
Unit - I	**1. Correlation** 1.1 Bivariate data, Scatter diagram and interpretation. 1.2 Concept of correlation between two variables, positive correlation, negative correlation, no correlation. 1.3 Covariance between two variables (m11) ,Definition, computation, effect of change of origin and scale. 1.4 Karl Pearson's coefficient of correlation (r) : Definition, computation for ungrouped data and interpretation. Properties: (i) $-1 \leq r \leq 1$ (without proof), (ii) Effect of change of origin and scale (without proof). 1.5 Spearman's rank correlation coefficient: Definition, derivation of formula, computation and interpretation (without ties). In case of ties, compute Karl Pearson's correlation coefficient between ranks. (Spearman's rank correlation coefficient formula with correction for ties not expected.)	**10**
Unit - II	**2. Linear Regression Model** 2.1 Meaning of regression, difference between correlation and regression, 2.2 Concept of error in regression, error modeled as a continuous random variable. Simple linear regression model: $Y = a + b X + \varepsilon$, where ε is a continuous random variable with $E(\varepsilon) = 0$, $V(\varepsilon) = \sigma^2$. Estimation of a, b by the method of least squares. Interpretation of parameters. Statement of the estimator of σ^2. 2.3 Concept of residual, plot of residual against X, concept of coefficient of determination.	**9**
Unit - III	**3. Fitting of curves to the bivariate data** 3.1 Fitting of line ($Y = a + b X$), 3.2 Fitting of second degree curve ($Y = a + b X + c$	**9**

	X^2), 3.3 Fitting of exponential curves of the type $Y = a b^X$ and $Y = aX^b$. **In all these curves parameters are estimated by the method of least squares.**	

Unit - IV	**4. Theory of Attributes**
	4.1 Attributes: Concept of a Likert scale, classification,
	     notion of manifold classification, dichotomy, class-
	     frequency, order of a class, positive class-frequency,
	     negative class frequency, ultimate class frequency,
	     relationship among different class frequencies (up to
	     three attributes), and dot operator to find the relation
	      between frequencies, fundamental set of class
	      frequencies.
	4.2 Consistency of data upto 2 attributes.
	4.3 Concepts of independence and association of two
	      attributes.
	4.4 Yule's coefficient of association (Q), $-1 \leq Q \leq 1$
	      interpretation.
		8

Unit -V	**5. Time Series**
	5.1 Meaning of Time Series
	5.2 Various components of a time series (Explanation and illustrations of each component)
	5.3 Additive and Multiplicative methods for analysis of a
	      time series
	5.4 Methods of estimating trends
	          (i) Freehand or Graphical method
	          (ii) Method of semi-averages
	          (iii) Method of moving averages
	          (iv) Method of least squares
	5.5 Simple numerical problems.
		12

References:
1.   Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age
       International   Publishers, New Delhi.
2.   Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of
Statistics,   Vol. 1,   Sixth Revised Edition,The World Press Pvt. Ltd.,
Calcutta.
3.   Gupta, S. C. and Kapoor, V. K. (1983). Fundamentals of Mathematical
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4.   Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, Third   Edition, Sultan Chand and Sons Publishers, New Delhi.

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6.   Sarma, K. V. S. (2001). Statistics Made it Simple: Do it yourself on PC. Prentce Hall of India, New Delhi.

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