


UNIVERSITY OF MYSORE
Estd. 1916

VishwavidyalayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/55/2024-25

Dated: 20.07.2024

Notification

Sub:-Syllabus and Scheme of Examinations of Statistics (UG) programme (I & II Semester) from the Academic year 2024-25.

Ref:-1. Decision of Board of Studies in Statistics (CB) meeting held on 06-06-2024.

2. Decision of the Faculty of Science & Technology meeting held on 19-06-2024.

3. Decision of the Academic Council meeting held on 28-06-2024.

The Board of Studies in Statistics (CB) which met on 06-06-2024 has resolved to recommend & approved the Syllabus and Scheme of examinations of Statistics (UG) programme (I & II Semester) with effect from the Academic year 2024-25.

The Faculty of Science & Technology and Academic Council at their meetings held on 19-06-2024 and 28-06-2024 respectively has also approved the above said Syllabus and Scheme of examinations hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be downloaded from the University Website i.e., www.uni-mysore.ac.in.


Registrar
Registrar
University of Mysore
Mysore

To:

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Statistics, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Mathematics, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan, Manasagangothri, Mysore.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council, Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
10. Office Copy.

B.Sc.Statistics-Major

Syllabi for Semesters I & II from Academic Year 2024 onwards

Course Content of Semester – I

Title: Course 1: Descriptive Statistics	Course Credits: 3 (Theory)
Total Contact Hours: 42	Duration of ESA: 3 hours
Formative Assessment Marks: 20	Summative Assessment Marks: 80
Authors: Members of Board of Studies in Statistics (composite)	

Number of lecture
hours/semester

42

Assessment

Formative
Assessment /IA

C-1: 10 Marks
C-2: 10 Marks

Summative
Assessment

C-3: 80 marks

Course 1: Descriptive Statistics

48hrs

Unit – 1 : Introduction to Statistics:

Statistics - Definition and scope, concepts of statistical population and sample (Simple Random Sampling, Stratified, Systematic and Cluster sampling methods - Definitions only). Data: quantitative and qualitative, cross-sectional and time-series, discrete and continuous. Scales of measurement: nominal, ordinal, interval and ratio. Presentation of data: tabular and graphical. Frequency distributions, cumulative frequency distributions and their graphical representations including Stem-and-leaf diagram. **12 hrs**

Unit – 2: Univariate Data Analysis:

Concepts of Measures of central tendency, measures of dispersion, Arithmetic Mean, Median, Mode, Geometric and Harmonic means, properties, merits and limitations, relations between these measures; Range, Quartile deviation, Mean deviation, Standard deviation and their relative measures. Moments, Skewness and Kurtosis. Quantiles and measures based on them. Box-Plot. Outliers. **12hrs**

Unit – 3: Bivariate Data Analysis:

Bivariate Data, Scatter plot, Correlation, Karl Pearson's correlation coefficient, Rank correlation: Spearman's and Kendall's measures. Principle of least squares, Simple linear regression and its properties. Fitting of linear regression line and coefficient of determination, fitting of polynomial and exponential curves. **12hrs**

Unit –4: Multivariate Data Analysis:

Analysis of Categorical Data: Contingency table, independence and association of attributes, measures of association. Multivariate Frequencies, Multivariate Data Visualization, mean vector and dispersion matrix, Multiple linear regression, multiple and

partial correlation coefficients. Residual error variance.

References:

1. Agresti, A. (2010): Analysis of Ordinal Categorical Data, 2nd Edition, Wiley.
2. Anderson T.W. and Jeremy D. Finn (1996). The New Statistical Analysis of Data, Springer
3. Freedman, D., Pisani, R. and Purves, R. (2014), Statistics, 4th Edition, W. W. Norton & Company.
6. Joao Mendes Moreira, Andre C P L F de Carvalho, Tomas Horvath (2018), General Introduction to Data Analytics, Wiley.
8. Johnson, R.A. and Bhattacharyya, G.K. (2006), Statistics: Principles and methods. 5th Edition, John Wiley & Sons, New York.
9. Medhi, J. (2005), Statistical Methods, New Age International.
10. Ross, S.M. (2014), Introduction to Probability and Statistics for Engineers and Scientists, 5th Edition, Academic Press.
11. Tukey, J.W. (1977), Exploratory Data Analysis, Addison-Wesley Publishing Co.
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Pedagogy:

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
2. Students are encouraged to use resources available on open sources.



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Course 2: Practical-I- Descriptive Statistics

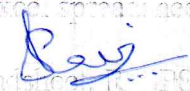
Number of practical Credits	Number of practical hours/semester	Assessment	
		Formative Assessment /IA	Summative Assessment
02	52	C-1: 10 Marks C-2: 10 Marks	C-3: 80 marks

Course 2: Practical –I - Descriptive Statistics

(Students have to carry-out all practical manually as well as using Excel spreadsheet)

One or two sessions on Important Statistical software's (Excel spreadsheet, R, SPSS, Python, etc.) and their uses

1. Presentation of data by frequency tables, diagrams and graphs, stem-and-leaf, partition values.
2. Arithmetic Mean (AM), geometric mean, harmonic mean, weighted AM, trimmed mean, corrected mean.
3. Mode, median, partition values.
4. Absolute and relative measures of dispersion, Box-plot.
5. Problems on moments, skewness and kurtosis.
6. Fitting of curves by least squares method.
7. Product moment correlation coefficient and rank correlation.
8. Regression of two variables.
9. Multivariate Descriptive statistics, mean vector, dispersion matrix correlation matrix, Partial and Multiple correlation.
10. Problems on Association of attributes.


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Course Content of Semester – II

Title: Course 3: Probability Theory and Distributions	Course Credits:3
Total Contact Hours: 42	Duration of ESA: 3 hours
Formative Assessment Marks: 20	Summative Assessment Marks: 80
Authors: Members of Board of Studies in Statistics (composite)	

Course 3: Probability Theory and Distributions 48 Hours


Number of lecture hours/semester	Assessment	
	Formative Assessment /IA	Summative Assessment
42	C-1: 10 Marks C-2: 10 Marks	C-3: 80 marks

Unit – 1 : Probability: 12hrs
 Probability - Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications

Unit – 2: Random variables, Mathematical Expectation, Generating Functions 12 hrs
 Random variables - discrete and continuous, probability mass function, probability density function, cumulative distribution function, illustrations and properties of random variables, univariate transformations with illustrations. Mathematical Expectation and Generating Functions - Expectation of single random variable and its properties. Moments and Cumulants, moment generating function, cumulant generating function.

Unit: 3 Two dimensional random variables: 12 hrs
 Joint distribution, Marginal distribution, Conditional distributions; conditional expectation, covariance, correlation and moments. Distribution of functions of random variables using moment generating function, and distribution function. Transformation of variables technique (one and two variables).

Unit :4 Standard Distributions: 12 hrs
 Discrete distributions - Rectangular, Geometric, Negative Binomial, Hypergeometric, Multinomial- definition through probability mass function, mean, variance, moments, p.g.f., m.g.f., other properties and applications. Continuous distributions - Uniform, Gamma, Exponential, Beta (type 1 and type 2), definition through probability density function, mean, variance, moments, m.g.f., other properties and applications.



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References

1. Dudewitz. E.J. and Mishra. S. N. (1998), Modern Mathematical Statistics. John Wiley.
2. Goon A.M., Gupta M.K., Das Gupta .B. (1991), Fundamentals of Statistics, Vol. I, World Press, Calcutta.
3. Gupta. S.C and V.K. Kapoor (2020), Fundamentals of Mathematical Statistics, Sultan Chand and Co, 12th Edition.
4. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009), Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.
5. Mood, A.M., Graybill, F.A. and Boes, D.C. (2007), Introduction to the Theory of Statistics, 3rd Edition. (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
6. Pitman, J. (1993). Probability. Springer.
7. Ross, S. (2002), A First Course in Probability, Prentice Hall.

Pedagogy

1. The course is taught using traditional chalk and talk method using problem solving through examples and exercises.
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Course 4: Practical-II- Probability Theory and Distributions

Number of practical Credits	Number of practical hours/semester	Assessment	
		Formative Assessment /IA	Summative Assessment
02	52	C-1: 10 Marks C-2: 10 Marks	C-3: 80 marks

Course 4: Practical II: - Probability Theory and Distributions

List of Experiments to be conducted:

1. Computing probabilities using addition and multiplication theorems.
2. Conditional probability and Bayes' theorem
3. Problems on pmf, cdf, expectation, variance, quantiles, skewness, kurtosis (Discrete Case).
4. Problems on pdf, cdf, expectation, variance, quantiles, skewness, kurtosis (Continuous case).
5. Bivariate Probability Distributions - Marginal and Conditional distributions,
6. Bivariate Probability Distributions - Conditional Mean, Conditional Variance, Correlation.
7. Fitting of discrete distributions-I
8. Fitting of discrete distributions-II
9. Fitting of Continuous distributions-I
10. Fitting of Continuous distributions-II


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M.Sc. Statistics (FCBCS and CAGP)

From 2024 onwards

Syllabus of a new Softcore Course

Computational Data Science with R

(4 Credits - LTP 202 – 2 hours of Theory and 4 hours of Practical teaching per week)

Unit 1: Introduction to Data Science and R/Python. Exploratory data analysis, Data visualization and interactive data exploration. Introduction to big data – V's of big data, sources of big data, storage problems of big data. Structured and unstructured data. Social media analysis- social media analytic tools like Keyhole, AgoraPulse, Brandwatch, BrandMentions, Meltwater and so on. Data mining, predictive data mining and descriptive data mining. Difference between predictive and descriptive data mining. (10 hrs.)

Unit 2: Introduction to artificial intelligence and machine learning. Supervised and unsupervised machine learning algorithms. Linear regression- simple and multiple linear regression models, analysis of regression modelling, multicollinearity, model selection and interpretation. Classification- k-nearest neighbours (k-NN), distance metrics used in k-NN classification, Clustering- hierarchical and non-hierarchical clustering techniques. (8 hrs.)

Unit 3: Spam filtering- Naïve Bayes' algorithm. Logistic regression- estimation of the parameters, sigmoid function, odds ratio, Receiver operating characteristic (ROC) curve, area under the curve (AUC). (6 hrs.)

Unit 4: Dimension reduction: Singular value decomposition (SVD), properties of SVD, Principal component analysis (PCA) – scree plot, Biplot, Factor analysis – Exploratory factor analysis, confirmatory factor analysis, rotations in factor analysis. (8 hrs.)

References:

1. Aravind Sathi. (2012) Big Data Analytics: Disruptive Technologies for changing the Game, MC Press.
2. Frank J. Ohlhorst. (2012) Big Data Analytics: Turning Big data into Big Money, Wiley.
3. James, G., Witten, D., Hastie, T and Tibshirani, R. (2021). An Introduction to Statistical Learning- with applications in **R**, Springer.
4. James, G., Witten, D., Hastie, T., Tibshirani, R and Taylor, J. (2023). An Introduction to Statistical Learning- with applications in **Python**, Springer.
5. Montgomery, D.C, Peck, E.A. and Vining, G.G. (2003). Introduction to Linear Regression, John Wiley.
6. Pyne S, Prakasa Rao BLS, Rao, SB (2016). Big Data Analytics. Springer India.
7. Rachel Schutt and Cathy O'Neil. (2015) Doing Data Science-Straight Talk from The Frontline.
8. Rao, C. R. (1973) Linear Statistical Inference and its Applications, Second Edition, Wiley Eastern.
8. Searle, S. R. (1982) Matrix Algebra Useful for Statistics, Wiley.

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