Resolution No.: AC/I/(24-25).3.RUA14

S. P. Mandali's

Ramnarain Ruia Autonomous College

(Affiliated to University of Mumbai)

RUIA COLLEGE
Explore • Experience • Excel

Syllabus for

Program: F.Y.B.A.

Program Code: RUASTA

(As per the guidelines of National Education Policy 2020-
Academic year 2024-25)

(Choice based Credit System)

GRADUATE ATTRIBUTES

S. P. Mandali's Ramnarain Ruia Autonomous College has adopted the Outcome Based Education model to make its science graduates globally competent and capable of advancing in their careers. The Bachelors Program in Science also encourages students to reflect on the broader purpose of their education.

GA	GA Description **A student completing Bachelor's Degree in Science program will be able to:**
GA 1	Recall and explain acquired scientific knowledge in a comprehensive manner and apply the skills acquired in their chosen discipline. Interpret scientific ideas and relate its interconnectedness to various fields in science.
GA 2	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences.
GA 3	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
GA 4	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
GA 5	Take complex challenges, work responsibly and independently, as well as in cohesion with a team for completion of a task. Communicate effectively, convincingly and in an articulate manner.
GA 6	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
GA 7	Follow ethical practices at work place and be unbiased and critical in interpretation of scientific data. Understand the environmental issues and explore sustainable solutions for it.
GA 8	Keep abreast with current scientific developments in the specific discipline and adapt to technological advancements for better application of scientific knowledge as a lifelong learner.

PROGRAM OUTCOMES

PO	Description **A student completing Bachelor's Degree in Science program in the subject of Statistics will be able to:**
PO 1	Understand, condense, visualize, analyze and interpret various data types generated in various scenarios of scientific, industrial, or social problems
PO 2	Apply Statistical tools for data analysis.
PO 3	Pursue their higher education programs leading to post-graduate and/or doctoral degrees in Statistics, Data Science, Business Analytics, Biostatistics, Econometrics, Management Studies.
PO 4	Compete globally to enter into promising careers.
PO 5	Make a pathway to a range of traditional avenues in Academia and Industry, Govt. Service, IAS, Indian Statistical/ Economic Services, Industries, Commerce, Investment Banking, Banks and Insurance Sectors, CSO and NSSO, Research Personnel/Investigator in Govt. organizations such as NCAER, IAMR, ICMR, Statistical and Economic Bureau & various PSUs., Market Research, Actuarial Sciences, Biostatistics, Demography etc.

CREDIT STRUCTURE B.A.

Semester	Subject 1		Subject 2	GE/ OE course (Across disciplines)	Vocational and Skill Enhancement Course (VSC) & SEC	Ability Enhancement Course/ VEC/IKS	OJT/FP/ CEPCC, RP	Total Credits
	DSC	DSE						
1	4		4	4 (2*2)	VSC-2 + SEC -2	AEC- 2 (CSK) + VEC- 2 (Env Sc.) + IKS-2		22
2	4		4	4 (2*2)	VSC-2 + SEC-2	AEC-2 (CSK)+ VEC-2 (Understanding India)	CC-2	22
Total	8		8	8	8	10	2	44
Exit option: award of UG certificate in Major with 44 credits and an additional 4 credit Core NSQF course/ Internship or Continue with Major and Minor								
3	Major 8		Minor 4	2	VSC-2	AEC-2 MIL	FP -2, CC-2	22
4	Major 8		Minor 4	2	SEC-2	AEC-2 MIL	CEP-2, CC-2	22
Total	16		8	4	4	4	8	44
Exit option: award of UG Diploma in Major with 88 credits and an additional 4 credit Core NSQF course/ Internship or Continue with Major and Minor								
5	DSC 12	DSE 4	Minor 2		VSC-2		CEP/FP-2	22

6	**DSC 12**	**DS E 4**	**Mino r 2**				**OJT-4**	**22**
Total	**24**	**8**	**4**		**2**		**6**	**44**
	Exit option: award of UG Degree in Major with 132 credits or Continue with Major for Honours/ Research							

Course Code- Discipline Specific Core: RUASTA.O101

Course Title: DESCRIPTIVE STATISTICS

Academic year 2024-25

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Explain the necessity for measures of central tendency. Apply diverse measures of central tendency to varied types of data. Compare and contrast the utility of mean, median, and mode, along with justifying the advantages and disadvantages of each measure.
CO 2	Compute and comprehend measures of dispersion. Differentiate between Absolute and Relative measures of dispersion.
CO 3	Deduce and establish raw moments and central moments. Interpret Skewness and Kurtosis of data while identifying outliers. Reformulate the aforementioned Course Outcomes.

DETAILED SYLLABUS

Course Code	Unit	Course/ Unit Title	No. of Hours
RUASTA.O101	**Unit I**	**Measures of central tendency** • Concept of central tendency of data, Requirements of good measures of central tendency. • Location parameters: Median, Quartiles, Deciles, and Percentiles • Mathematical averages Arithmetic mean (Simple, weighted mean, combined mean), Geometric mean, Harmonic mean, Mode, Trimmed mean. • Empirical relation between mean, median and mode. Merits and demerits of using different measures & their applicability.	**15**
RUASTA.O101	**Unit II**	**Measures of Dispersion, Skewness & Kurtosis** • Concept of dispersion, Requirements of good measure • Absolute and Relative measures of dispersion: Range, Quartile Deviation, Inter Quartile Range, Mean absolute deviation, Standard deviation. • Variance and Combined variance, raw moments and central moments and relations between them. Their properties • Concept of Skewness and Kurtosis: Measures of Skewness: Karl Pearson's, Bowley's and Coefficient of skewness based on moments. Measure of Kurtosis. Absolute and relative measures of skewness. Box Plot: Outliers	**15**
RUASTA.O101	**Unit III**	• Karl Pearson's Product moment correlation coefficient and its properties. • Spearman's Rank correlation. (With and without ties) • Concept of Simple linear regression. Principle of least squares. Fitting a straight line by method of least squares (Linear in Parameters) • Relationship between regression coefficients and correlation coefficient, cause and effect relationship, Spurious correlation. • Concept and use of coefficient of determination (R^2).	**15**

		• Fitting of curves reducible to linear form by transformation.	

References:

1. Medhi J.: "Statistical Methods, An Introductory Text", Second Edition, New Age International Ltd.
2. Agarwal B.L.: "Basic Statistics", New Age International Ltd.
3. Spiegel M.R.: "Theory and Problems of Statistics", Schaum's Publications series. Tata McGraw-Hill.
4. Kothari C.R.: "Research Methodology", Wiley Eastern Limited.
5. David S.: "Elementary Probability", Cambridge University Press.
6. Hoel P.G.: "Introduction to Mathematical Statistics", Asia Publishing House.
7. Hogg R.V. and Tannis E.P.: "Probability and Statistical Inference". McMillan Publishing Co. Inc.
8. Pitan Jim: "Probability", Narosa Publishing House.
9. Goon A.M., Gupta M.K., Dasgupta B.: "Fundamentals of Statistics", Volume II: The World Press Private Limited, Calcutta.
10. Gupta S.C., Kapoor V.K.: "Fundamentals of Mathematical Statistics", Sultan Chand &Sons
11. Gupta S.C., Kapoor V.K.: "Fundamentals of Applied Statistics", Sultan Chand & Sons

Work Load of Practical

Course	PRACTICALS	Credits	Hours / Week
RUASTA.O101	**DESCRIPTIVE STATISTICS**	**3**	**3**
RUASTAP.O101	**Practical based on** RUASTA.O101	**1**	**2**

Distribution of Practical

Course Code: RUASTAP.O101	
Sr. No.	**Practical based on course**
1	Measures of central tendency-1
2	Measures of central tendency-2
3	Measures of dispersion
4	Moments, Skewness and Kurtosis
5	Practical using Excel i. Measures of central tendency ii. Measures of dispersion
6	Correlation analysis
7	Regression analysis
8	Fitting of curve

9	Practical using Excel i. Correlation analysis ii. Regression analysis iii. Fitting of curve
10	Revision Session – I
11	Revision Session – II
12	Revision Session – III

Course Code- Discipline Specific Core: RUASTA.E111
Course Title: STATISTICAL METHODS

Academic year 2024-25

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Explain and distinguish between random and non-random experiments, highlighting their respective characteristics.
CO 2	Calculate the probabilities associated with events and investigate their independence.
CO 3	Grasp the notion of a random variable, analyse its probability distribution in both Univariate and Bivariate contexts, and utilize its properties effectively.
CO 4	Use standard discrete probability distributions to analyse real-life data scenarios.

DETAILED SYLLABUS

Course Code	Unit	Course/ Unit Title	No. of Hours
RUASTA.E111	**Unit I**	**Elementary Probability Theory** • Trial, random experiment, sample point and sample space. • Definition of an event, Operation of events, mutually exclusive and exhaustive events. • Classical (Mathematical) and Empirical definitions of Probability and their properties. • Theorems on Addition and Multiplication of probabilities Independence of events, Pair-wise and Mutual Independence for three events, Conditional probability, Bayes' theorem and its applications	**15**
RUASTA.E111	**Unit II**	**Discrete random variable** • Random variable. Definition and properties of probability distribution and cumulative distribution function of discrete random variable.	**15**

		• Raw and Central moments and their relationships. • Concepts of Skewness and Kurtosis and their uses. • Expectation of a random variable. Theorems on Expectation & Variance	
RUASTA.E111	**Unit III**	**Some Standard Discrete Distributions** • Degenerate (one point): Discrete Uniform, Bernoulli, Binomial, Poisson and Hypergeometric distributions derivation of their mean and variance for all the above distributions • Poisson approximation to Binomial distribution, Binomial approximation to hypergeometric distribution	**15**

Work Load of Practical

Course	PRACTICALS	Credits	Hours / Week
RUASTA.E111	**STATISTICAL METHODS**	**3**	**3**
RUASTAP.E111	**Practical based on** RUASTA.E111	**1**	**2**

Distribution of Practical

Course Code: RUASTAP.E111	
Sr. No.	**Practical based on course**
1	Probability 1
2	Probability 2
3	Probability 3
4	Discrete Random Variables
5	Bivariate Probability Distributions
6	Binomial Distribution
7	Poisson Distribution
8	Hypergeometric Distribution
9	Practical using Excel i. Binomial Distribution ii. Poisson Distribution iii. Hypergeometric Distribution
10	Revision session 1
11	Revision session 2
12	Revision session 3

References:

12. Medhi J.: “Statistical Methods, An Introductory Text”, Second Edition, New Age International Ltd.
13. Agarwal B.L.: “Basic Statistics”, New Age International Ltd.
14. Spiegel M.R.: “Theory and Problems of Statistics”, Schaum’s Publications series. Tata McGraw-Hill.
15. Kothari C.R.: “Research Methodology”, Wiley Eastern Limited.
16. David S.: “Elementary Probability”, Cambridge University Press.
17. Hoel P.G.: “Introduction to Mathematical Statistics”, Asia Publishing House.
18. Hogg R.V. and Tannis E.P.: “Probability and Statistical Inference”. McMillan Publishing Co. Inc.
19. Pitan Jim: “Probability”, Narosa Publishing House.
20. Goon A.M., Gupta M.K., Dasgupta B.: “Fundamentals of Statistics”, Volume II: The World Press Private Limited, Calcutta.
21. Gupta S.C., Kapoor V.K.: “Fundamentals of Mathematical Statistics”, Sultan Chand &Sons
22. Gupta S.C., Kapoor V.K.: “Fundamentals of Applied Statistics”, Sultan Chand & Sons

Modality of Assessment: Department Specific Course

(3 Credit Theory Course)

A) Internal Assessment- 30 Marks

Sr. No	Evaluation type	Marks
1	Class Test/ Project / Assignment / Presentation / Open book test	20
2	Class Test/ Project / Assignment / Presentation / Open book test	10
	TOTAL	**30**

B) External Examination (Semester End)- 45 Marks

Semester End Theory Examination:

1. Duration – The duration for these examinations shall be of **One hour 30 Minutes**.
2. Theory question paper pattern:

Paper Pattern:

Question	Options	Marks	Questions Based on
1	Any 2 out of 3 subparts	15	Unit I
2	Any 2 out of 3 subparts	15	Unit II

3	Any 2 out of 3 subparts	15	Unit III
	TOTAL	**45**	

C) Practical Examination Pattern (Per Semester)

Practical Examination …….. **50 Marks**.

Journal and attendance …… **5 Marks**

At the end of the semester, examination of **2 hours** duration.

Pattern of **Practical question** paper at the end of the semester for **the course**:

1. Paper will consist of **two questions**.
2. Each **question** of **15 marks** will consist of three sub-questions with following mark distribution.
3. Learners will attempt one question.

Sub-Questions	Marks	Questions on
1	15	Unit I
2	15	Unit II
3	15	Unit III
Total	**45**	

PRACTICAL BOOK/JOURNAL(5 marks)

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will **not be allowed to appear for the examination. The journals will be certified if the student attends 75% practicals.**

In case of loss of Journal and/or Report, a Lost Certificate should be obtained from Head/ Co-ordinator / In charge of the department; failing which the student will not be allowed to appear for the practical examination.

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