

Resolution No: AC/II(22-23).3.RUS1

S. P. Mandali's
Ramnarain Ruia Autonomous College
(Affiliated to University of Mumbai)



Syllabus For:
Program: Integrated M.Sc. in Bioanalytical
Sciences
(FYBSC Syllabus)

Program Code: RUSBAS

As Per Guidelines of National Education Policy 2020 – Academic Year 2023-24

(Choice Based Credit System)

GRADUATE ATTRIBUTES

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
PO 1	A student completing Bachelor's Degree in Science program in the subject of Bioanalytical Sciences will be able to: This course will impart high quality science education in a vibrant academic ambience with the faculty of distinguished teachers and scientists.
PO 2	It will also equip students for the future who will take up the challenge of doing quality research & teaching and also contribute to industrial production and R & D in the fields of Bioanalysis, Bioinformatics and Nutraceutical Sciences.
PO 3	It will amalgamate classical analytical chemical techniques with modern genomic and proteomic technologies of manufacturing and analysis to better characterize the products useful as medicines as well as nutraceuticals.

Subject IV- Computational Sciences RUSBAS.0104

Course Title: Mathematics

Academic Year 2023-24

F.Y.B.Sc.

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION
CO 1	Adapt and apply the basic arithmetic calculations.
CO 2	Apply the mathematical equations to find solutions to given problems.

Paper Code	Semester I	Credits/ Hours
RUSBAS.0104	Mathematics	3/45
104.1	Matrices and System of Linear Equations	15
Matrices over R (order 2 & 3): Matrix operations (addition, subtraction, scalar multiplication, matrix multiplication, transpose of a matrix (it's properties), inverse by elementary row transformation, adjoint method, solution of system of equation both homogenous and non-homogenous using matrix (concept of Rank to be introduced) Determinants: Determinant of a matrix of order 2 and 3, elementary properties of determinants, solving a system of linear equations (up to 3 variables) using Cramer's rule and application to medicines, pharmaceuticals, food and vitamins.		
104.2	Calculus and Ordinary Differential Equation & Applications	15
Derivatives: Definition by first principle method, rules addition, subtraction, multiplication, division (only statements), and its applications. Approximation and errors: Rolle's theorem, Lagrange's mean value theorem, Extreme values using first and second derivatives (application type problem) First order differential equations: Review of separable differential equations, homogenous and non- homogenous differential equation. Linear differential equations and Bernoulli differential equations. Second order linear differential equations: The general second order differential equations, existence and uniqueness, theorem for the solutions of a second order initial value problem (statement only) Emphasis should be on solving problems with different rules.		

Reference Books:

1. S. Lang Linear Algebra
2. Schaum's outlines on matrices
3. Simmons, G.F., Differential Equations with Applications and Historical Notes,
4. Chapter1, Sections 1,2,3 of Elements of Partial Differential, McGraw Hill
5. Serge Lang, Introduction to Linear Algebra, Springer Verlag,
6. Balaguruswamy, E., Discrete Mathematics and Its Applications, Numerical Methods, Tata McGraw Hill

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Subject IV- Computational Sciences RUSBAS.E114

Course Title: Statistics I

Academic Year 2023-24

F.Y.B.Sc.

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION
CO 1	Understand Types of Data and Data Condensation and visualization
CO 2	Differentiate between measures of dispersion and measures of central tendency and apply the correct measure(s) of dispersion.

Paper Code	Semester II	Credits/ Hours
RUSBAS.E114	Statistics I	3/45
204. Types of Data and Data Condensation 1		15
Concept of Population and Sample. Finite, Infinite Population, Notion of SRS, SRSWOR and SRSWR Different types of scales: Nominal, Ordinal, Interval and Ratio. Methods of Data Collection: i) Primary data: concept of a Questionnaire and a Schedule, ii) Secondary Data Types of data: Qualitative and Quantitative Data; Time Series Data and Cross Section Data, Discrete and Continuous Data Tabulation Dichotomous classification- for two and three attributes, Verification for consistency Association of attributes: Yule's coefficient of association Q. Yule's coefficient of Colligation Y, Relation between Q and Y (with proof). Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution Data Visualization: Graphs and Diagrams, Histogram, Polygon/curve, Ogives. Bivariate Frequency Distribution of discrete and continuous variables		
204. Measures of Central Tendency & Measures of Dispersion 2		15
Concept of central tendency of data, Requirements of good measures of central tendency. Location parameters: Median, Quartiles, Deciles, and Percentiles		



<p>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. Concept of dispersion, Requirements of good measures of dispersion. Absolute and Relative measures of dispersion: Range, Quartile Deviation, Inter Quartile Range, Mean absolute deviation, Standard deviation. Concept of Skewness and Kurtosis Box Plot: Outliers</p>	
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Reference Books:

<p>Statistics I</p>	<ul style="list-style-type: none"> • Biostatistics: A foundation for analysis in Health Sciences, Wayne. W. Daniel • Methods in Biostatistics, B.K. Mahajan
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