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

S. P. Mandali's

Ramnarain Ruia Autonomous College

(Affiliated to University of Mumbai)

Integrated M.Sc. in Bioanalytical Sciences

(F.Y.B.Sc. 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 A student completing Bachelor's Degree in Science program in the subject of Bioanalytical Sciences will be able to:
PO 1	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.

Vocational Skill Course - RUSVSCBAS.O101
Course Title: Tools & techniques in Biology

Academic Year 2023-24

F.Y.B.Sc.

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION
CO 1	Operate basic equipments in a biological laboratory.
CO 2	Describe various microscopy techniques.
CO3	Perform basic techniques in microbiology. They will be able to perform plant identification and authentication.

Paper Code	Semester I	Credits/Hours
RUSVSCBAS.O101	**Tools & techniques in Biology**	**3/45**
105.1 Basic Equipments in Biological Lab		**15**
Principle, significance, and applications of: Muffle furnace, Hot Air Oven, Water bath, Ultrasonicator (probe and bath), Centrifuge, Rotary shaker (for tubes & flasks), Rotary vacuum evaporator, Autoclave, Incubator, vortex machine, Cyclomixer & Pulverizer, Analytical weighing balance, pH meter, Conductometer, Dissolved Oxygen meter, TDS meter, Potentiometer, Colorimeter.		
105.2 Microscopy		**15**
Principle and working of: Simple microscopy, Compound microscopy, Phase contrast microscopy, Fluorescence microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy Applications of different microscopic techniques in various fields.		
105.3 Techniques in Biology		**15**
Basic Techniques in Microbiology- Inoculation, incubation, isolation, inspection, and identification, Concept of asepsis, sterilization, and disinfection Plant collection, identification & Authentication, Anatomical evaluation. Laboratory animal management		
RUSVSCBASP.O101	**Practicals**	Credits/Hours 1/30
1. Operation of Hot Air Oven, Water bath, Vortex, Rotary shaker, Ultrasonicator, Centrifuge in routine analysis. 2. Operation of pH meter (calibration and analysis) 3. Various types of Media preparation for Microbial growth 4. Aseptic Transfer		

5. Isolation of bacteria and study of colony characteristics 6. Gram staining of bacteria, fungal staining 7. Study of population count 8. Anatomical study of a plant specimen (Sectioning and powder)

Reference Books:

Tools & techniques in Biology	1. B. P. Pandey, Plant Anatomy, S Chand 2. Micheal J. Pelczar, Jr., E.C.S.Chan, Noel R. Krieg – Microbiology

Vocational Skill Course - RUSVSCBAS.E111

Course Title: Computational Skills

Academic Year 2023-24

F.Y.B.Sc.

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION
CO 1	Effective use of algorithms and graphs for analysis and representation of biological data.
CO 2	Solving problems based on numerical methods.

Paper Code	Semester II	Credits/Hours
RUSVSCBAS.E111	**Computational Skills**	**3/45**
1	Algorithms & Graphs	**15**
1. Definition and characteristics of an algorithm, selection and interactive constructs in pseudocode. Data structures like array. 2. Sorting, insertion sort, bubble sort 3. Searching algorithms, linear search, and binary search 4. Algorithms on integers, algorithm on matrices. 5. Introduction to graphs: types of graph (simple graph, multigraph, pseudograph, directed graph, with an example of each), some special simple graphs(complete graph, cycle, wheel in graph, loop, bipartite graph, regular graph) 6. Representing graphs and graph isomorphism, their application 7. Elementary combinatories: Sets; functions; relations (equivalence relations) 8. Permutations and combinations with respect to applications.		
2	Microsoft Office I (MS word and PowerPoint)	**15**
MS Word: Creating, editing, saving, and printing text documents, Font and paragraph formatting, Simple character formatting, inserting tables, smart art, page breaks, using lists and styles, working with images, Using Spelling and Grammar check, understanding document properties, Mail Merge, Create and Manage References, Design advanced documents, Use of google documents **MS Power Point:** Opening, viewing, creating, and printing slides, applying auto layouts, adding custom animation, using slide transitions, graphically representing data: Charts & Graphs, Creating Professional Slide for Presentation, Working with Objects,		

Hyperlinks and Action Buttons, Working with Movies and Sounds, Using SmartArt and Tables, Animation and Slide Transition, using slide Master, Slide show option, Proofing and Printing, google slides	
3 Microsoft Office Excel	**15**
Introduction to Excel, Formatting excel work book, Perform Calculations with Functions, Sort and Filter Data with Excel, Create Effective Charts to Present Data Visually, Analyze Data Using PivotTables and Pivot Charts, Protecting and Sharing the work book, Use Macros to Automate Tasks, Proofing and Printing, handling google datasheets, introduction to google data studio and excel dashboards	
RUSVSCPBAS.E111 **1.** Creating word documents and formatting the research article/Report **2.** Using different kinds of smart arts for effective representation of a scientific concept/process **3.** Creating a template and preparing a PowerPoint presentation on a given topic **4.** Making a PowerPoint presentation on a given topic **5.** Creating different types of chart using excel, calculations using excel **6.** Inserting references in a word document	**Credits/Hours 1/30**

Reference Books:

Computational Skills	1. Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. 2. "Algorithms Unlocked" by Thomas H. Cormen. 3. "The Algorithm Design Manual" by Steven S. Skiena. 4. A Textbook of Graph Theory 2nd Edition, Kindle Edition by R. Balakrishnan (Author), K. Ranganathan (Author, Contributor)