Resolution No. AC/II(22-23).3.RUS2

S. P. Mandali's

Ramnarain Ruia Autonomous College

(Affiliated to University of Mumbai)

RUIA COLLEGE
Explore • Experience • Excel

Syllabus for

Program: F.Y.B.Sc.

Program Code: RUSBCH

(As per the guidelines of National Education Policy 2020-Academic year 2023-24)

(Choice Based Credit System)

GRADUATE ATTRIBUTES

S.P. Mandali's Ramnrain 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 Bachelor's 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 workplace 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 BIOCHEMISTRY will be able to:
PO 1	Achieve better understanding of the major thrust areas of the disciplines like Chemistry of Biomolecules & their metabolism, Cell biology (Basics, Membrane biochemistry, Cancer), Enzymology, Genetics, Plant Biochemistry, Pharmacology, Microbiology & Immunology.
PO 2	Gain acumen of the fundamental biochemical processes occurring at the molecular and gene level.
PO 3	Understand the role of Biochemistry in food and human nutrition
PO 4	Get insights into multiple important analytical tools for Biochemical testing and apply contextual knowledge and tools of biochemical research for problems solving.
PO 5	Acquire and empower technical knowledge by connecting disciplinary and interdisciplinary aspects of biochemistry.
PO 6	Compile and interpret Biological data using Biostatistics and Bioinformatics tools.
PO 7	Express ideas persuasively through scientific writing and oral presentation which will help in the development of the leadership qualities.
PO 8	Possess scientific temperament by research project-based learning.
PO 9	Procure hands-on real time experience in industries.
PO 10	Get exposure to the strong theoretical and practical understanding of various dimensions of Biochemistry and take up research-oriented courses in the fields of Biochemistry, Nutrition & Dietetics, Molecular Biology, etc.

CREDIT STRUCTURE BSc

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	DSE 4	Minor 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							

SEMESTER I

Course Code: RUSVSCBCH.O101

Course Title: Tools of Biochemistry

Type of course: Vocational Skill Course (VSC)

Academic year 2023-24

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Define basic analytical instrumentation with deep knowledge in its core concepts and its applications.
CO 2	Illustrate the principle, Instrumentation, working of spectroscopic techniques (Flame photometry & AAS) and its applications in various research fields
CO 3	Enlist the cognitive, technical and creative skills which enables students to gain an established knowledge and practice concerning basic analytical instrumentation and measurement techniques
CO 4	Choose and apply suitable analytical technique to identify different biomolecules
CO 5	Develop skill in carrying out research projects by employing the basic biochemical and molecular techniques.
CO 6	Identify and describe the parts of microscope. To study the distinguishing features, principle components and applications of various types of light and electron microscope.
CO 7	Develop an analytical insight to understand the principle and methodology of centrifugation, different types & application of centrifuge and rotors.
CO 8	Make use of theoretical concepts of Spectroscopy, Microscopy & Centrifugation and develop experimental acumen.

DETAILED SYLLABUS

Course Code	Unit	Course/ Unit Title Tools of Biochemistry RUSVSCBCH.O101	Credits/ Hours 1 / 15 Hours
I	**1**	**Tools of Biochemistry (Spectroscopy, Microscopy & Centrifugation)**	**15**
	1.1	Spectroscopy	
		Introduction, Beer Lambert's Law	
		Principle, Working & Application of Colorimeter and Spectrophotometer	
	1.2	Microscopy	
	1.2.1	Introduction and basic concept of Magnification, Resolving power, Numerical aperture, Limit of resolution, refractive index and role and RI of oil	
	1.2.2	Parts and functions of Compound microscope	
	1.2.3	Light microscope- Bright Field, Dark field, Phase contrast, Fluorescence microscopy	
	1.3	Centrifugation	
	1.3.1	Principle of centrifugation, basic rules of sedimentation, sedimentation coefficient	
	1.3.2	Types and applications of centrifuges – Clinical, High speed, Ultra centrifuge - preparative and analytical.	

Practical

Sr. No	**Course code-** RUSVSCBCHP.O101 **Practical Title-** Practicals based on RUSVSCBCH.O101	1 Credit
1	Study of Colorimeter	
2	Estimation of absorbance maxima & molar extinction coefficient	
3	Colorimetric estimation of pigment / dye	
4	Cell count using optical density	
5	Study of the parts of a compound microscope	
6	Cell count using microscope	
7	Effect of centrifugal force on the separation of residue	

References:

1. Principles & Techniques of Practical Biochemistry – Wilson, Walker- Cambridge Univ. Press.
2. Biophysical Chemistry, Principles & Techniques – Upadhyay, Upadhyay and Nath – Himalaya Publ. House.
3. Analytical Biochemistry - David Holme & Hazel Peck - Pearson Education Ltd, England

4. Principles of Instrumental Analysis - Douglas A. Skoog, F. James Holler, Stanley R. Crouch – Thomson Brooks/Cole
5. A.L., Lehninger, Principles of Biochemistry (1982), Worth Publishers, Inc. New York.
6. Laboratory Manual in Biochemistry - J. Jayaraman - New Age International
7. An Introduction To Practical Biochemistry - Plummer David
8. Keith Wilson & John Walker, Practical Biochemistry, principle and technique, Cambridge University, 5th edition
9. Plummer, David T.; Introduction to practical biochemistry; Tata Mc. Graw and Hill publishers.

Modality of Assessment: Vocational Skill Course (VSC)
(2 Credit Theory Course for BSc)

A) Internal Assessment- 40%- 30 Marks

Sr No	Evaluation type	Marks
1	Class test	20
	TOTAL	**20**

B) External Examination- (Semester End) 60%- 30 Marks

Semester End Theory Examination:

1. Duration - These examinations shall be of **One hour** duration.
2. Theory question paper pattern:

Paper Pattern:

Question	Options	Marks	Questions Based on
Q1.	Any 4 out of 6	20	UNIT I
Q2.	Any 5 out of 7	10	UNIT I
	TOTAL	**30**	

Practical Examination Pattern: Total Marks 25

Particulars	Marks
Laboratory Work	25
Viva & Journal	05
Total	30