Resolution No. - AC/II(23-24).2.RUS7

S. P. Mandali's

Ramnarain Ruia Autonomous College

(*Affiliated to Mumbai University*)

RUIA COLLEGE
Explore • Experience • Excel

Syllabus for Skill Enhancement Course (SEC)

Program: F.Y.B.Sc. Life Science

Program Code: RUSLSc

(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	Demonstrate an understanding of biological systems across microorganisms, plants and animals. To develop necessary laboratory skills and analytical methods.
GA 2	Employ critical thinking and scientific knowledge to design experiments, record observations, analyse data and interpret results. They can further build their career in research.
GA 3	Create an awareness of environmental issues, biological diversity, and how we can make a positive impact on it.
GA 4	Inculcate scientific temperament and generate problems solving approaches in students when they integrate themselves in the larger society.
GA 5	Develop necessary laboratory skills and analytical methods.

PROGRAM OUTCOMES

PO	Description A student completing Bachelor's Degree in Science program in the subject of Life Science will be able to:
PO 1	To be able to describe the biomolecules and metabolic processes, compare developmental processes and physiological systems in plants and animals, neuroendocrine system, short term and long-term memory, learning and behaviour, neurological disorders, biological evolution, human evolution of thought process, which allows for curiosity, and enhances learning process ahead.
PO 2	To be able to describe interspecific interactions in the ecosystem, Plant Tissue Culture techniques and its significance in agriculture, germplasm conservation and secondary metabolites, and Animal Tissue Culture techniques, Fermentation Technology and its role in industry and society
PO 3	To be able to explain DNA Cloning, use of cloning vectors like *E. coli* plasmids, cosmids, phagemids, viral vectors, significance of restriction enzymes, apply Mendel's laws, gene regulation in prokaryotes and eukaryotes, defence mechanisms in plants and animals, innate and adaptive immune system.
PO 4	Apply Biostatistics to analyse, Probable Chance of Occurrence, Normal Population, Student's t-test, Correlation and Regression analysis, Chi-Square test, data analysis for project work
PO 5	Skills-Perform assays to identify, purify, quantify, immobilize proteins/enzymes using techniques like Centrifugation, Electrophoresis and Chromatography, dissection of animals, protocols to handle preserved animals, working in aseptic conditions, use and maintaining of diagnostic kits, pedigree analysis in humans, karyotyping in plants
PO 6	Environment and Sustainability- to analyse the local biodiversity at residential sites of students and the changes occurring in the biodiversity and to conserve the same, awareness about implementation of Laws Regulations, citizens awareness to oppose under the aegis of NGO

PO 7	Ethics- awareness of plagiarism in scientific work, acknowledging/ citing the work, lab ethics in handling biological materials and chemicals, to be able to apply professional and ethical principles, minimize waste and ethical waste disposal
PO 8	Communication skills- to be able to communicate clearly through presentations as well as document, write effective reports or communicate and work in a team
PO 9	Project Management- to be able to write SOPs for instruments, design experiments, analyse data, work in a team, a scientific way of thinking, a diverse approach to scientific enquiry towards an idea.
PO 10	Life Long Learning- to be able to learn independently and adapt to changing needs of the society

CREDIT STRUCTURE BSc

Semester	Subject 1		Subject 2	GE/ OE course (Across disciplines)	Vocational and Skill Enhancement Course (VSC) & SEC	Ability Enhancement Course (AEC) / VEC/ IKS	OJT/FP/CEP/CC /RP	Total Credits
	DSC	DSE						
1	4		4	4	VSC-2 + SEC -2	AEC- 2 (CSK) + VEC- 2 (Env Sc.) + IKS-2		22
2	4		4	4	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		CEPFP-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 Honors/ Research							

Skill Enhancement Course (SEC)

Course Title: Techniques in Life Science

Course Code: RUSSECLSc.E111

Type of Course: Skill Enhancement Course

Academic year 2023-24

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Demonstrate a comprehensive understanding of different types of microscopy, including light microscopy and fluorescent microscopy, as well as the principles and applications of electron microscopy (SEM and TEM).
CO 2	Analyze the factors influencing microbial growth and evaluate the role of various culture media (enriched and minimal) in supporting the growth, isolation, and preservation of E. coli. Understand the life cycle and growth curve of E. coli.
CO 3	Understand the structure and function of cytoskeletal elements, including microfilaments, microtubules, and intermediate filaments, and analyze their role in various cellular processes, such as cytoplasmic streaming, mitotic spindle function, and structural support.
CO 4	Compare and contrast different modes of heterotrophic nutrition, including holozoic, saprophytic (fungi), and parasitic (Cuscuta, Tapeworm). Analyze fluid feeders (e.g., Mosquito or Housefly), microphagous organisms (e.g., Amoeba or Paramecium), and macrophagous organisms (mammals).
CO 5	Apply theoretical knowledge to practical scenarios, such as conducting microscopy experiments, microbial culture, and growth analysis, to develop essential laboratory skills and scientific methodologies.
CO 6	Evaluate and critically analyze research literature related to microscopy, microbial growth, and cytoskeletal elements to understand current advancements and applications in the field of biology and contribute to scientific discussions and research.

DETAILED SYLLABUS

RUSSECLScP.111		Practicals in Techniques in Life Science	2 Credit/ 15 Lectures
		1. Microscopy **Study of Electron Micrographs of listed below:** Endoplasmic reticulum (Rough and smooth). Golgi complex. **2. Study of Mouth parts in insect and Comparative assessment of mouth parts:** Siphoning Type - eg.Butterfly Biting and Chewing type- eg Cockroach (if available **3. Collection of blood group information from family and construction of pedigree charts**. **4. Separation techniques:** i. Thin Layer Chromatography ii. Electrophoresis **5. Introduction to Applied Entomology - Apiculture , Sericulture**. **6. Detection of Dehydrogenase enzyme activity using sprouting grams / beans or muscle (as a study of mitochondrial function)** **7. Estimation of Catalase enzyme activity using paper** **disc rising-time technique (Blood/Plant source).**	

Modalities of Assessment

Skill Enhancement Course - (2 Credit Course for BSc)

C) Practical Examination Pattern: Total Marks 50

A. **Internal Examination: 40%- 20 Marks**

Sr. No.		Marks
1	Laboratory work, GLP, etiquettes – Continuous assessment	15
2	Journal	05
	TOTAL	**20**

B. **External Examination: 60%- 30 Marks**

Semester End Practical Examination:

Question	Options	Marks
1	Main question to perform Experimental task / Estimation / Biostatistical analysis	15
2	Identification	10
3	Viva	05
	TOTAL	**30**
