

Resolution No. - AC/II(22-23).3.RUS7

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



Syllabus for UG

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

Program Code: RUSLSc

Vocational Skill Course (VSC)

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

(Choice based Credit System)



Vocational Skill Course (VSC)

Course Title: Techniques in Life Science

Course Code: RUSVSCLS.Sc.0101

Type of Course: Vocational Skill 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 microscopies, 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

Course Code/ Unit	Unit	Course/ Unit Title	Credits/ Hours
RUSVSCLS.O101		Techniques in Life Science	1 credit / 15 Hours
	I	<p>Theory related to practicals</p> <p>Microscopy: Principles of light and Fluorescent Microscopy, Electron Microscopy-Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM).</p> <p>Microbial growth: Influencing factors, culture media (enriched and minimal), isolation, preservation, life cycle and growth curve of <i>E.coli</i>.</p> <p>Cytoskeletal elements: Microfilaments: Structure and function in striated muscle fibers. Role in cytoplasmic streaming in plants. Microtubules: Structure as in cilia or in flagella, mechanism in movement. Function in mitotic spindle Intermediate filaments: Structure and function.</p> <p>Heterotrophic nutrition – Holozoic, saprophytic (fungi) and parasitic (Cuscuta, Tapeworm) i) fluid feeders (ex. Mosquito or Housefly) ii) microphagous (ex. Amoeba or Paramecium) iii) macrophagous (mammals)</p>	
RUSVSCLS.P.01 01		Practicals in Techniques in Life Science	1 credit / 15 Hours
		<p>1. Preparation of solutions of a given chemical compound Molar and percentage solutions – Concept and calculations only.</p> <p>2. Instrumentation and techniques: Calibration of the pH Meter with standard buffer pH4 and pH9.2 as per GLP Checking of pH for common foodstuff e.g. Milk/cola drink/Lime juice or any other relevant sample.</p> <p>3 Microscopy Study of Electron Micrographs as listed below:</p>	



	<p>Mitochondria Lysosomes: Basement membrane/ junctions Cilia: Both normal and pathological Basement membrane/ junctions Cilia or Flagella</p> <p>4. Study of Mouth parts in insect and Comparative assessment of mouth parts: Preparation of fresh mount of; Piercing and sucking type- eg Mosquito Sponging type- eg Housefly Biting and Chewing type- eg Cockroach (if available)</p> <p>5. Effect of temp on movements in plants and animals using any system: Cytoplasmic streaming in Vallisneria and Hydrilla</p> <p>6. Collection of blood group information from family and construction of pedigree charts.</p> <p>7. Colorimetry: Preparation of dilutions of required concentration from a stock solution of a coloured compound Estimation of Lambda max of a coloured solution. Verification of Beer Lambert’s law for a coloured solution Absorption Spectra-Colour solution, plant pigment. Lambda max</p> <p>8. Effect of ageing on plant leaf pigments / separation of amino acids – using Paper Chromatography. TLC</p> <p>9. Microbial growth curve, streak plate method/isolation methods etc</p> <p>10. Separation techniques: Paper and thin layer chromatography, principle of electrophoresis, differential centrifugation, Salting in and salting out (Ammonium sulphate fractionation).</p> <p>11. Biostatistics: Purpose of Biostatistics: Data collection & statistical analysis of the biodiversity field study. Representation – Ogive curve, histogram and pie diagram. Measures of central tendency – Mean, Median, Mode and Standard Deviation.</p>	
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Modalities of Assessment



Vocational Skill Course - (2 Credit Theory Course for BSc)

A) Internal Assessment 40% - 10 Marks

Class Test / Project / Assignment / Presentation

B) External Examination (Semester End) 60%- 15 Marks

Semester End Theory Examination:

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

Paper Pattern:

Question	Options	Marks	Questions Based on
1	Answer any 3 out of 4 (5 marks each)	15	Unit 1
	TOTAL	15	

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
