

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



**Syllabus for**

**Program: UG Biotechnology**

**Program Code: RUSBTK**

(Credit Based Semester and Grading  
System for Academic Year 2023–2024)

## GRADUATE ATTRIBUTES

GA	Description
	<b>A student completing Bachelor's Degree in Science program will be able to:</b>
<b>GA 1</b>	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.
<b>GA 2</b>	Evaluate scientific ideas critically, analyse problems, explore options for practical demonstrations, illustrate work plans and execute them, organise data and draw inferences.
<b>GA 3</b>	Explore and evaluate digital information and use it for knowledge upgradation. Apply relevant information so gathered for analysis and communication using appropriate digital tools.
<b>GA 4</b>	Ask relevant questions, understand scientific relevance, hypothesize a scientific problem, construct and execute a project plan and analyse results.
<b>GA 5</b>	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.
<b>GA 6</b>	Apply scientific information with sensitivity to values of different cultural groups. Disseminate scientific knowledge effectively for upliftment of the society.
<b>GA 7</b>	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.
<b>GA 8</b>	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
	<b>A student completing Bachelor's Degree in Science program in the subject of Biotechnology will be able to:</b>
<b>PO 1</b>	Adept in basic sciences along with a thorough understanding of biotechnology principles and chemical sciences to create a foundation for higher education with the insights into interdisciplinary approach.
<b>PO 2</b>	Demonstrate the applications of fundamental biological processes from the molecular, cellular, industrial and environmental perspective.
<b>PO 3</b>	Develop effective communication skills with improved individual and team work abilities in the domain of scientific research writing. Showcase their innovative ideas and research work efficiently.
<b>PO 4</b>	Reflect, analyse and interpret information or data for investigating the problem in fields of biotechnology. Acquire scientific and entrepreneur skills to furnish sustainable solutions to coeval problems
<b>PO 5</b>	Illustrate the relevance of ethical implications and standard laboratory practices in tissue culture techniques, forensic biology, developmental biology and other fields of biotechnology.
<b>PO 6</b>	Apply the conceptual knowledge to develop coherent, efficacious and proficient practical, technical and analytical skills.

## PROGRAMME OUTLINE

YEAR	SEMESTER	PAPER	COURSE CODE	COURSE TITLE	CREDITS
FYBSc	I		RUSBTK.O101	Biotechnology I- Fundamentals of biotechnology	3
			RUSBTKP.O10 1	Practicals based on Biotechnology I- (Fundamentals of biotechnology)	1
			RUSBTK.O102	Fundamentals of chemistry for biotechnology	3
			RUSBTKP.O10 1	Practicals based on Fundamentals of chemistry for biotechnology	1
		GE	RUSGEBTK.O 101	IPR-I	2
		VSE	RUSVSCBTK. O101	Techniques of forensic science - I	1
			RUSVSCBTKP .O101	Practicals of VSE	1
		SEC	RUSSECBTK.O1 01	Microscopy and microbial techniques	1
			RUSSECBTKP.O 101	Practicals of SEC	1
		FYBSc	II		RUSBTK.E111
	RUSBTKP.E111			Practical of Biotechnology-II	1
I			RUSBTK.E112	Bioorganic chemistry	3

			RUSBTKP.E112	Practical of subject 2	1
		GE	RUSGEBTK.E111	IPR-II	2
		VSE	RUSVSCBTK.E11 1	Techniques in forensic science -II	1
			RUSVSCBTKP.E1 11	Practicals of VSE	1
		SEC	RUSSECBTK.E11 1	Techniques in tissue culture	1
			RUSSECBTKP.E1 11	Practicals of SEC	1

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**Semester I**  
**Course Code: RUSVEC.O101**  
**Course Title: Value Education Course (VEC)**  
**Environmental Science**

**Academic year 2023-24**

**COURSE OUTCOMES:**

COURSE OUTCOME	DESCRIPTION
CO 1	Understand the importance of the concepts of ecology and environment
CO 2	Understand different approaches to ecology and the principles associated with it
CO 3	Gain insights into the concept of environmental degradation and its impact on human life
CO 4	Students realize the need of their role to actively participate and contribute to environmental protection and sustainable development
CO 5	Comprehend the concept of disasters and how disasters can be managed in India and To lead and create a conducive living atmosphere to self and others.

**DETAILED SYLLABUS**

Course Code/ Unit	Unit	Course/ Unit Title	Credits/ Lectures
RUSVEC.O101	I - II	<b>ENVIRONMENTAL SCIENCE</b>	<b>2/30</b>
	I	<b>Approaches to Understanding Ecology</b>	<b>15</b>
		1. Concept of Ecology and Environment 2. Approaches to ecology - Anthropocentrism, Biocentrism and Eco centrism, Ecofeminism and Deep Ecology 3. Environmental Principles – Sustainability principle, Polluter Pays principle, The Precautionary principle, The Equity	

		principle	
	<b>II</b>	<b>Dealing with Environmental Concerns</b>	<b>15</b>
		1. Environmental Degradation – Causes and Impact on Human Life 2. Sustainable Development – Concept and Components 3. Disaster Management - Prevention, Mitigation and Disaster Preparedness	
	<b>Total</b>		<b>30</b>

## References:

1. Biju, M.R., *Human Rights in a Developing Society*, Mittal Publications, New Delhi, 2005.
2. Dreze, Jean and Sen Amartya, *India: Economic Development and Social Opportunity*, Oxford University Press, Oxford, 1998.
3. Goel, S.L., *Encyclopaedia of Disaster Management*, Vol. I, II & III; Deep and Deep Publications Pvt. Ltd., New Delhi, 2006.
4. Guha, Ramchandra and Gadgil, Madhav, (eds.), *Ecology and Equity: The Use and Abuse of Nature in The Contemporary India*, Routledge, 1995.
5. Mohapatra, Gaur Krishna Das, *Environmental Ecology*, Vikas, Noida, 2008.
6. Motilal, Shashi, and Nanda, Bijoy Lakshmi, *Human Rights: Gender and Environment*, Allied Publishers, New Delhi, 2007.
7. Murthy, D. B. N., *Disaster Management: Text and Case Studies*, Deep and Deep Publications, New Delhi, 2013.
8. Parsuraman, S., and Unnikrishnan, (eds.), *India Disasters*, Report II, Oxford, New Delhi, 2013
9. Reza, B. K., *Disaster Management*, Global Publications, New Delhi, 2010.
10. Sharma, P.D., *Ecology and Environment*, Rastogi Publications, 2015.

11. Shiva, Vandana, *Ecology and the Politics of Survival: Conflict over Natural Resources in India*, Sage Publications, California, 1991.
12. Shiva, Vandana, *The Violence of the Green Revolution*, University of Kentucky Press, Kentucky, 2016.

## Books in Marathi

1. Pawar, Dr. Kishor, Dr. Nalini, *Paryavaranshastra*, Nirali Prakashan, Pune, 2017.
2. Raut, Dr. P. D, *Paryavaran Abhyas*, Shivaji University, Kolhapur, 2022.
3. Vyavahare, Ramanand, *Shashwat Vikas*, Educational Publishers, Aurangabad.

## MODALITY OF ASSESSMENT

### Theory Examination Pattern:

**A) Internal Assessment - 40% : 20 marks.**

(Class Test)

**B) External Examination - 60 % : 30 marks.**

**1. Semester End Theory Assessment - 30 marks**

i. Duration - This examination shall be of **1 Hour** duration.

(Two Questions of 15 marks each/Three Questions of 10 Marks each)

### Overall Examination and Marks Distribution Pattern

RUSVEC.O101	Semester I		Total
	Internal	External	



<b>Theory</b>	<b>20</b>	<b>30</b>	<b>50</b>
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