



**College of Arts,  
Science &  
Commerce**

**RISE WITH EDUCATION**  
**Sion (West), Mumbai – 400022**  
**(Empowered Autonomous)**

**Faculty: Science**

**Program: B.Sc.**

**Subject: BIOTECHNOLOGY**

**Academic Year: 2024 – 2025**

**S.Y.B.Sc. Biotechnology**

**Credit Based Semester and Grading Syllabi approved  
by Board of Studies in Biotechnology to be brought into  
effect from June 2024.**

## **PREAMBLE**

Biotechnology, broadly defined, includes any technique that uses living organisms, or parts of such organisms, to make or modify products, to improve plants or animals, or to develop microorganisms for specific use. The interdisciplinary nature of biotechnology integrates living systems including animal, plant and microbes and their studies from molecular biology to cell biology, from biochemistry to biophysics, from genetic engineering to stem cell research, from bioinformatics to genomics-proteomics, from environmental biology to biodiversity, from microbiology to bioprocess engineering, from bioremediation to material transformation and so on. Biotechnology is the science of today and tomorrow. It has applications in all major service sectors i.e. health, agriculture, industry, environment etc. Biotechnology as an application science has taken firm footing in many countries, abroad where a number of transgenic crops, genetically modified food and recombinant therapeutic molecules for human and animal health are available in the market. Biotechnology as a science of service to human society is yet to make inroads in India

With the advent of World Wide Web in the early nineties and its subsequent growth, the latest research trends have become accessible from drawing rooms across the globe. This acted as a positive feedback mechanism in increasing the pace of research in all fields including Chemical Engineering and Biotechnology. This was the motivation for an in depth analysis of what is actually required for today's technology. It is also important to take advantage of the freely available software to enhance the quality and quantity of material that can be covered in the classroom.

This restructured syllabus is therefore intended to combine the principles of physical, chemical and biological sciences along with developing advanced technology. The undergraduate curricula is prepared to impart primarily basic knowledge of the respective subject from all possible aspects. In addition, students will be trained to apply this knowledge particularly in day-to-day applications of biotechnology and hence get a flavor of research.

**PROGRAM SPECIFIC OUTCOMES**

An undergraduate student upon completion of this program is expected to gain the following attributes:

- Understand and describe the nature of the basic concepts of Cell biology, Microbiology Chemistry and Biochemistry with an interdisciplinary perspective about of other branches of Life Sciences.
- Explain the application of Biotechnology in the field of Medicine, Agriculture, Environment, and Sustainable development.
- Describe and explain the concepts of Immunology, Neurochemistry, Recombinant DNA technology and correlate them towards diagnosis and therapy of diseases and understanding how they can contribute towards the alleviation of human suffering.
- Discover and examine the causes of environmental pollution and devise methods to control the release of biohazardous waste into the environment.
- Perform practical as per laboratory standards in Chemistry, Biochemistry, Microbiology and Molecular Biology – Understand and analyze the results.
- Effectively communicate using ICT enabled tools and critically analyze and explain the data in a lucid manner.

Semester III				
Course Type	Course Code	Course Title	Credits	Lectures/week
DSC Major I	SIUBTMJ211	Immunology	3	3
	SIUBTMJP211	Practical	1	2
DSC Major II	SIUBTMJ212	Cell biology and Cytogenetics	3	3
	SIUBTMJP212	Practical	1	2
DSC Minor	SIUBTMN211	Bio-organic chemistry	3	3
	SIUBTMNP211	Practical	1	2
VSC	SIUBTVS211	Biostatistics	1	1
		Practical	1	2
OE	SIUBTOE211	Food Science	2	2
AEC	SIUHNAE211	Hindi / Marathi	2	2
CC	SIUEXCC211	NCC/ NSS/ Sports /Cultural activities	2	
FP / CEP	SIUBTFP211	Field projects/ Internships/ Apprenticeship/ community engagement and services	2	
		<b>Total</b>	<b>22</b>	
Semester IV				
Course Type	Course Code	Course Title	Credits	Lectures/week
DSC Major I	SIUBTMJ221	Molecular Biology	3	3
	SIUBTMJP221	Practical	1	2
DSC Major II	SIUBTMJ222	Medical Microbiology	3	3
	SIUBTMJP222	Practical	1	2
DSC Minor	SIUBTMN221	Bioanalytical chemistry	3	3
	SIUBTMNP221	Practical	1	2
SEC	SIUBTSE221	Bioinformatics	1	1
		Practical	1	2
OE	SIUBTOE221	Food Processing and Safety	2	2
AEC		Hindi / Marathi	2	2
CC		NCC/ NSS/ Sports /Cultural activities	2	
FP / CEP		Field projects/ Internships/ Apprenticeship/ community engagement and services	2	
		<b>Total</b>	<b>22</b>	

### SEMESTER III

COURSE CODE	TITLE	CREDITS	LECTURES
SIUBTOE211	OE : FOOD SCIENCE	2	1 lecture = 1 hour
<b>Course Outcomes</b>	On successful completion of the course the learner will be able to: <ul style="list-style-type: none"> <li>• learn the basic concepts of fermentation</li> <li>• understand the process of making wine and cheese</li> <li>• describe the benefits of fermented food and nutraceuticals</li> </ul>		
<b>Unit I</b> Fermentation	Introduction, History of fermentation, Difference between fermentation and pickling, Common types of fermented food, How fermentation works, Benefits of fermented food  Basic design of a fermenter and its parts  Types of wine and cheese, Fermentation process of making wine and cheese	2	15
<b>Unit II</b> Nutraceuticals	Nutraceuticals : Sources, Properties and functions of various nutraceuticals (lycopene, melatonin, grape products, flaxseed oil)  Food as remedies: Nutraceuticals bridging the gap between food and drug, Nutraceuticals in treatment for cognitive decline, Brief idea about some nutraceutical rich supplements (Bee pollen, Caffeine, Green tea, Spirulina)		15

**SEMESTER IV**

<b>COURSE CODE</b>	<b>TITLE</b>	<b>CREDITS</b>	<b>LECTURES</b>
<b>SIUBTOE221</b>	<b>OE : FOOD PROCESSING AND SAFETY</b>	<b>2</b>	<b>1 lecture = 1 hour</b>
<b>Course Outcomes</b>	On successful completion of the course the learner will be able to: <ul style="list-style-type: none"> <li>• discuss the effect of baking and coating on food</li> <li>• learn the concept of packaging, storage, and recycling</li> <li>• discuss the suitability of packaging material for different types of food</li> <li>• understand the hazards associated with food and need of food regulation</li> </ul>		
<b>Unit I</b> Baking & Roasting	Theory of baking and roasting, Equipment and types, Effect on food (texture, flavor, aroma, color, nutritional value) Baking process of bread Coating materials, Enrobers, Dusting or Breadding, Pan coating and types (Hard, soft and chocolate)	<b>2</b>	<b>15</b>
<b>Unit II</b> Packaging and Food Safety	<b>Packaging:</b> Theory, Types, advantages and disadvantages of various packaging materials (textiles, wood, metals, glass, flexible films, plastic containers, paper and board, active packaging technologies), Printing barcodes, Labeling, Storage, Consumer recycling  <b>Food safety:</b> Introduction, Hazards to safe food, Contamination and spoilage, Sources of contamination, Existing methods to control contamination, Need for food safety management system, Food safety legislation, Customer audits of food and food products, food preservation by radiation Food regulatory agencies - FDA, ISO, FSSAI		<b>15</b>

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**Evaluation Scheme for Semester III and IV**

<b>Course Type</b>	<b>Internal</b>	<b>Sem-End</b>	<b>Practical</b>	<b>Participation / Report</b>	<b>Total</b>
DSC Major I	25	50	25	-	100
DSC Major II	25	50	25	-	100
DSC Minor	25	50	25	-	100
OE	20	30	-	-	50
AEC	20	30	-	-	50
VSC	50	-	-	-	50
CC	-	-	-	50	50
FP / CEP	-	-	-	50	50
<b>Total</b>					<b>550</b>