

# **SRI KRISHNA ARTS AND SCIENCE COLLEGE**

An Autonomous College, Affiliated to Bharathiar University  
Coimbatore – 641 008, Tamil Nadu, India.

## **LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)**

**M. Sc. Biotechnology  
(I to II Semester)**

**for 2023 - 24 admitted students**

**DEPARTMENT OF BIOSCIENCE**



**SRI KRISHNA ARTS AND SCIENCE COLLEGE**  
**COIMBATORE – 641 008**  
**DEPARTMENT OF BIOTECHNOLOGY**

**I. Programme Educational Objectives (PEOs)**

Post Graduates from the Biotechnology Programme are expected to achieve the following PEOs within three to five years of graduation

<b>PEO 1</b>	To update, extend and intensify students 'knowledge thorough a flexible, research - intensive program.
<b>PEO 2</b>	To enhance career opportunities in industry, clinical settings both locally and globally or as a preparation for further higher education through in –house state of the art laboratory exposures and outbound dissertation activities.
<b>PEO 3</b>	To enable critical thinking and full - fledged grasp of essential aspects of bioethics
<b>PEO 4</b>	To enrich the global thinktanks with right mixes of innovative ability, existing policies at generating and safeguarding the product of their intellect, equipped with entrepreneurship abilities.

**II. Programme Learning Outcomes (PLOs)**

The following Programme Learning Outcomes have been identified for M. Sc. Biotechnology:

<b>PLO 1</b>	<b>Knowledge:</b> Provide education that leads to comprehensive understanding of the principles and practices of biotechnology. <b>(Cognitive)</b>
<b>PLO 2</b>	<b>Critical Thinking:</b> To empower students with the ability to think and solve problems in the field of biotechnology. <b>(Cognitive)</b>
<b>PLO 3</b>	<b>Practical Skills:</b> Demonstrate skills to use modern analytical tools/ software/ equipment's and analyze and solve problems in various courses of biotechnology. <b>(Psychomotor)</b>
<b>PLO 4</b>	<b>Teamwork Skills:</b> Function and contribute as a team in the diversified environment in taking competitive decision. <b>(Affective)</b>
<b>PLO 5</b>	<b>Communication Skills:</b> Apply written and oral communication skills to communicate effectively in healthcare, industry, academia and research. <b>(Affective)</b>
<b>PLO 6</b>	<b>Digital Skills:</b> Demonstrate the ability to use state-of-the-art digital tools and software to mine the data, procure, analyse and present the biological data. <b>(Affective)</b>
<b>PLO 7</b>	<b>Numeracy Skills:</b> Develop an ability to solve, analyse and interpret data generated from experiments done in project work or practical courses. <b>(Cognitive)</b>
<b>PLO 8</b>	<b>Leadership Skills:</b> Ability to work in team towards solving broad societal and national issues <b>(Affective)</b>
<b>PLO 9</b>	<b>Lifelong Learning:</b> Students will be able to understand various facets of molecular procedures and basics of genomics, proteomics and metabolomics that could be employed in early diagnosis and prognosis of human diseases. <b>(Affective)</b>
<b>PLO 10</b>	<b>Entrepreneurial Skills:</b> Students will be able to gain hands on experience in gene cloning, protein expression and purification. This experience would enable them to begin a career in industry that engages in genetic engineering as well as in research laboratories conducting fundamental research. <b>(Affective)</b>
<b>PLO 11</b>	<b>Ethics and Professionalism:</b> Adopt code of ethics in professional and social context and demonstrate exemplary professional, ethical and legal behaviors in decision making. <b>(Affective)</b>

### III. Programme Learning Outcomes Vs Graduate Attributes Vs Taxonomy of Verbs

PLO	Graduate Attributes											Blooms		
	Knowledge	Critical Thinking	Practical Skills	Team work Skills	Communication Skills	Digital Skills	Numeracy Skills	Leadership Skills	Lifelong Learning	Entrepreneurial Skills	Ethics & Professionalism	Cognitive	Psychomotor	Affective
1	✓											✓		
2		✓										✓		
3			✓										✓	
4				✓										✓
5					✓									✓
6						✓								✓
7							✓					✓		
8								✓						✓
9									✓					✓
10										✓				✓
11											✓			✓

### IV. Mapping of PEOs and PLOs

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11
PEO1	3		3			3					
PEO2		3					3				
PEO3				3				3		2	3
PEO4					3				2		

### V. Additional Programme Outcomes (APOs)

The Additional Programme Outcomes for M.Sc. Biotechnology are:

<b>APO 1</b>	The students will acquire knowledge on the basics of sound and solid base biotechnology which enables them to understand the emerging and advanced concepts of life sciences.
<b>APO 2</b>	They will be acquiring knowledge in the biotechnology domain that enables their applications in industry and research.
<b>APO 3</b>	They will have the ability to acquire technical know-how by link biotechnology, disciplinary and interdisciplinary aspects
<b>APO 4</b>	They will recognize the importance of bioethics, IPR, entrepreneurship, communication to bring India industrialists to the next generation.
<b>APO 5</b>	They will be developing scientific temperament and social responsibilities.

## VI. Programme Specific Outcomes (PSOs)

On the completion of M.Sc. Biotechnology, the graduates will be able to

<b>PSO 1</b>	Ability to apply biotechnology skills (including molecular and micro biology, immunology and genetic engineering, bioprocess and fermentation, enzyme and food technology and bioinformatics) and its applications in core and allied fields.
<b>PSO 2</b>	To impart in-depth practical oriented knowledge to students in various thrust areas of biotechnology, so as to meet the demands of industry and academia.

## VII. Curriculum Structure for M.Sc. Biotechnology

### Course Components, Credits & Marks Distribution

Course Type	Number of Courses	Credits per Course	Total Credits	Marks	Semester
Discipline Specific Courses (DSC)	19	2-6	75	1850	I to IV
Discipline Specific Elective Courses (DSE)	2	4	8	200	II & III
Generic Electives Courses (GEC)	3	2-4	7	200	II & III
DTC – Drive Through Courses (SWAYAM - NPTEL, Coursera, any courses certified by statutory bodies, etc.)	Additional 4 Credits per Course will be given on submission of Certificate				I to IV
<b>Total</b>			<b>90</b>	<b>2250</b>	

### 1. Discipline Specific Courses (DSC)

These courses are to be studied compulsorily by the students as a core requirement. The courses designed under this category aim to cover the basics that a student is expected to imbibe in the particular discipline.

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
1	23BTP01	Cell and Molecular Biology	1	4	4	100
2	23BTP02	Biochemistry	1	4	4	100
3	23BTP03	Microbiology	1	4	4	100
4	23BTP04	Genetics	1	4	4	100
5	23BTP05	Immunotechnology	1	4	4	100
6	23BTP06	Lab in Cell Biology and Microbiology	1	5	4	100
7	23BTP07	Lab in Biochemistry and Immunotechnology	1	5	4	100
8	23BTP08	Environmental Biotechnology	2	4	4	100

9	23BTP09	Bioprocess Engineering and Technology	2	4	4	100
10	23BTP10	Genetic Engineering and Bioethics	2	4	4	100
11	23BTP11	Lab in Bioprocess Technology and Environmental Biotechnology	2	5	4	100
12	23BTP12	Lab in Genetics and Genetic Engineering	2	5	4	100

## 2. Discipline Specific Electives (DSE)

Discipline Specific Elective Courses offered under the main discipline of study which may be specialized or advanced or supportive to the discipline of study.

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
1	23BTP13	Enzyme and Enzyme Technology	II	4	4	100
	23BTP14	Bionanotechnology				

## 3. Generic Elective Courses (GEC)

Generic Elective Courses are interdisciplinary in nature. They are additional courses based on expertise, specialization, requirements, scope, and need of the department.

Group	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
I	23GEP02	Biological Statistics and Research Methodology	II	4	3	100
	23GEP03	Quantitative Aptitude				

## 4. Drive Through Course (DTC)

### (DTC) I & II – Online Certification - Additional Credits

These courses are intended to bring out and promote the self-learning initiative of the students – where their own motivation is what drives them to complete the course and not external compulsions. This fosters the habit of keeping oneself updated always by means of self-study. It gives opportunities to the students to explore new areas of interest and earn additional credits. Students can take any number of courses under this cafeteria system. The credits will not be taken for CGPA calculation. Additional 4 credits per Course will be given on submission of certificate.

- SWAYAM - NPTEL
- Coursera
- Any courses certified by statutory bodies.

## VIII. Semester-wise Scheme

Semester I										
Course Code	Course Title	T/P	Ins. Hrs/week	Examination			Credits	SD/EM/EN	L/R/N/G	
				Dur. Hrs	CIA	ES				Total Marks
23BTP01	<b>DSC - I:</b> Cell and Molecular Biology	T	4	3	25	75	100	4	SD	N
23BTP02	<b>DSC - II:</b> Biochemistry	T	4	3	25	75	100	4	SD	N
23BTP03	<b>DSC - III:</b> Microbiology	T	4	3	25	75	100	4	SD	G
23BTP04	<b>DSC - IV:</b> Genetics	T	4	3	25	75	100	4	SD	N
23BTP05	<b>DSC - V:</b> Immunotechnology	T	4	3	25	75	100	4	EN	G
23BTP06	<b>DSC Practical - I:</b> Lab in Cell Biology and Microbiology	P	5	5	40	60	100	4	EM	G
23BTP07	<b>DSC Practical - II:</b> Lab in Biochemistry and Immunotechnology	P	5	5	40	60	100	4	EM	G
<b>DTC I - Additional Credit Courses (NPTEL/ Coursera)</b>										
<b>Total</b>			<b>30</b>				<b>700</b>	<b>28</b>		
Semester II										
Course Code	Course Title	T/P	Ins. Hrs/week	Examination			Credits	SD/EM/EN	L/R/N/G	
				Dur. Hrs	CIA	ES				Total Marks
23BTP08	<b>DSC - VI:</b> Environmental Biotechnology	T	4	3	25	75	100	4	EN	N
23BTP09	<b>DSC - VII:</b> Bioprocess Engineering and Technology	T	4	3	25	75	100	4	EM	G
23BTP10	<b>DSC - VIII:</b> Genetic Engineering and Bioethics	T	4	3	25	75	100	4	EM	G
23BTP11	<b>DSC Practical - III:</b> Lab in Bioprocess Technology and Environmental Biotechnology	P	5	5	40	60	100	4	EM	G
23BTP12	<b>DSC Practical - IV:</b> Lab in Genetics and Genetic Engineering	P	5	5	40	60	100	4	EM	G
23BTP13	<b>DSE - I: Biomolecules and Nanotechnology</b> A. Enzyme and Enzyme Technology B. Bionanotechnology	T	4	3	25	75	100	4	SD	G
23BTP14										
23GEP02	<b>GEC - I:</b> Biological Statistics and Research Methodology Quantitative Aptitude	T	4	3	25	75	100	3	EM	G
23GEP03									SD	G
<b>DTC II - Additional Credit Courses (NPTEL/ Coursera)</b>										
<b>Total</b>			<b>30</b>				<b>700</b>	<b>27</b>		
<b>Drive - Through Course (DTC):</b> Courses offered in SWAYAM - NPTEL, Coursera OR Any courses certified by statutory bodies.			Additional 4 Credits per Course will be given on submission of Certificate					During Semester I to Semester II		

The Courses focus on the following needs	
<b>SD</b>	Skill Development
<b>EM</b>	Employability
<b>EN</b>	Entrepreneurship
<b>N</b>	National
<b>G</b>	Global

### Semester-wise Distribution

Semester	Total Marks	Total Credits
I	700	28
II	700	27

### List of Courses Offered by Mathematics

SEM	Course Code	Course Title	T/P	Ins. Hrs/ week	Examination				Credits
					Dur. Hrs	CIA	ES	Total Marks	
II	23GEP02	Biological Statistics and Research Methodology	T	4	3	25	75	100	3
	23GEP03	Quantitative Aptitude							