

# **SRI KRISHNA ARTS AND SCIENCE COLLEGE**

An Autonomous College Affiliated to Bharathiar University  
Coimbatore - 641008, Tamil Nadu, India.

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

**B.Sc. Microbiology  
(I to II Semester)**

**For 2023-24 admitted students**

**DEPARTMENT OF BIOSCIENCE**



**SRI KRISHNA ARTS AND SCIENCE COLLEGE**  
COIMBATORE – 641008

**DEPARTMENT OF BIOSCIENCE**

(2023-2024)

<b>I. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)</b>	
<b>PEO 1</b>	Get ability to apply the process of science by formulating hypotheses and design experiments based on the scientific method.
<b>PEO 2</b>	Analyze and interpret results from a variety of microbiological methods and using quantitative reasoning by using mathematical calculations and graphing skills to solve problems in microbiology.
<b>PEO 3</b>	Communicate and collaborate with other disciplines by effectively communicating the fundamental concepts of microbiology in written and oral format.
<b>PEO 4</b>	Understand the relationship between science and society by recognizing and discussing logical, scientific and ethical issues in microbiology.

<b>II. PROGRAMME LEARNING OUTCOMES (PLOs)</b>	
<b>No.</b>	<b>The Graduates of B. Sc Microbiology Programme will be able to:</b>
<b>PLO1</b>	<b>Knowledge:</b> To acquire current/recent specific knowledge in the respective discipline with proficiency in practical skills and leadership skills for a successful career. <b>(Cognitive)</b>
<b>PLO2</b>	<b>Critical Thinking:</b> Critical thinking ability by way of solving problems with analytical approaches and data analytics using basic microbiology and biochemistry or chemistry concepts. <b>(Cognitive)</b>
<b>PLO3</b>	<b>Practical Skills:</b> Demonstrate the basic experimental techniques and methods in the areas of microbiology, biotechnology and chemistry/biochemistry. <b>(Psychomotor)</b>
<b>PLO4</b>	<b>Teamwork Skills:</b> Develop an overall personality by making them participate in various social and cultural activities voluntarily. <b>(Affective)</b>
<b>PLO5</b>	<b>Communication Skills:</b> Communicate effectively with the computing community as well as society to comprehend effective documentation and presentation. <b>(Affective)</b>
<b>PLO6</b>	<b>Digital Skills:</b> Incorporate advanced digital skills in designing, developing, managing and deploying in media and technical field. <b>(Affective)</b>
<b>PLO7</b>	<b>Numeracy skills:</b> Analyze the given scientific data critically and systematically and the ability to draw the objective conclusions. <b>(Cognitive)</b>
<b>PLO8</b>	<b>Leadership Skills:</b> To learn, adapt and disseminate knowledge in a world of constantly evolving technology. <b>(Affective)</b>
<b>PLO9</b>	<b>Lifelong Learning:</b> Recognize the need and ability to involve independent and life-long learning in the changing era of technology. <b>(Affective)</b>
<b>PLO10</b>	<b>Entrepreneurial Skills:</b> Successful candidates will be able to analyze, design standards, resolve and troubleshoot problems in implementation or standardization of Life sciences protocols coping up to suit in a position in academia or industry or

	Institutions and to pursue a career in research. (Affective)
<b>PLO11</b>	<b>Ethics and Professionalism:</b> Successful candidates will be aware of their role and responsibility in handling and use of microbes including genetically modified microorganisms. (Affective)

### III. PROGRAMME LEARNING OUTCOMES VS GRADUATE ATTRIBUTES VSTAXONOMY OF VERBS

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

### IV. PROGRAMME LEARNING OUTCOMES VS PROGRAMME EDUCATIONAL OBJECTIVES

PLO	PEO 1	PEO 2	PEO 3	PEO 4
PLO 1	✓			
PLO 2	✓			
PLO 3	✓			✓
PLO 4		✓		
PLO 5			✓	
PLO 6			✓	✓
PLO 7			✓	
PLO 8		✓		
PLO 9			✓	✓
PLO 10		✓		✓
PLO 11		✓		✓

### V. ADDITIONAL PROGRAMME OUTCOMES (APOs)

<b>APO 1</b>	The skills of observations and drawing logical inferences from the scientific experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.
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<b>APO 2</b>	Developed scientific outlook not only with respect to science subjects but also in all aspects related to life.
<b>APO 3</b>	Imbued ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
<b>APO 4</b>	Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
<b>APO 5</b>	Been able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems

#### VI. PROGRAMME SPECIFIC OUTCOMES (PSO's)

<b>PSO 1</b>	Understand the nature and basic concepts of Microbiology, Microbial biochemistry, Microbial ecology and to analyze the relationships among microbes and plants/ animals/ humans
<b>PSO 2</b>	Gain familiarity with applications of microbes for synthesis of valuable products through fermentation and to explore the application of genetic engineering to create GMO, transgenic plants, animals, Gene therapy, etc.,

#### VII. Curriculum Structure for B. Sc Microbiology

##### Course Components, Credits & Marks Distribution

Part No	Group	Basic Structure: Distribution of Courses	Number of Courses	Total Marks	Total Credits
I - II	1	AEC – Ability Enhancement Courses	10	1000	24
III	2	DSC – Discipline Specific Courses	18	1500	60
	3	DSE – Discipline Specific Electives	10	1000	40
	4	GEC – Generic Elective Courses	4	400	12
	5	SEC – Skill Enhancement Courses	2	100	4
IV	6	ANCC I & II – Audit Non-Credit Courses	2	-	-
V		ANCC III – Audit Non-Credit Courses	1	Completed	
-	7	DTC – Drive Through Courses (SWAYAM-NPTEL, Coursera, Any courses certified by statutory bodies, etc)	Any number	-	Addl. Credits
<b>Total</b>				<b>4000</b>	<b>140</b>

#### Group 1. Ability Enhancement Courses (AECs) (I & II Semesters)

AEC are the courses based upon the content that leads to knowledge enhancement. Ability Enhancement Courses (AEC) are the following:

S. No.	Course Code	Course Title	Semester	Ownership Department	Contact Hours	Credits	Marks
1	23AEC02/ 23AEC07/ 23AEC11	<b>AEC Part I: Language – I:</b> Tamil - I- Tamil Aazhi / Hindi-I/ French-I	I	Language Dept.	6	3	100
2	23AEC22	<b>AEC Part II: English-I:</b> English for Professional Communication	I	English Dept.	4	3	100
3	23AEC35	<b>AEC Part III:</b> Academic Skills for Bioscience_	I	Bioscience Dept	2	2	100
4	23AEC04/ 23AEC08/ 23AEC12	<b>AEC Part I: Language – II:</b> Tamil-II – Sudar Tamil/ Hindi-II/ French-II	II	Language Dept.	6	3	100
5	23AEC24	<b>AEC Part II: English – II:</b> Campus to Corporate	II	English Dept	4	3	100

### Group 2. Discipline Specific Courses (DSCs) (I & II Semesters)

These courses are to be studied compulsorily by the students as a core requirement. The students are required to take DSCs across six semesters. The courses designed under this category aim to cover the basics that a student is expected to imbibe in the particular discipline. It includes Major project.

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
1	23MBU01	<b>DSC - 1:</b> Microbiology	I	4	3	100
2	23MBU02/ 23BTU02	<b>DSC - 2:</b> Biochemistry	I	4	3	100
	23MBU03	<b>DSC - 3:</b> Lab in Microbiology and Biochemistry	I	5	4	50
3	23MBU04	<b>DSC - 4:</b> Microbial Diversity	II	4	3	100
4	23MBU05	<b>DSC - 5:</b> Microbial Physiology and Metabolism	II	4	3	100
	23MBU06	<b>DSC - 6:</b> Lab in Microbial Physiology and Metabolism	II	5	4	50

### Group 3. Discipline Specific Elective (DSEs) (I & II Semesters)

Discipline Specific Elective courses offered under the main discipline of study which may be specialized or advanced or supportive to the discipline of study. Students can choose any 10

courses from the following list.

S. No.	Course Code	Course Title	Ownership Department	Contact Hours	Credits	Marks
-	-	-	-	-	-	-

#### Group 4. Generic Elective Courses (GECs) (I & II Semesters)

Generic Elective Courses are interdisciplinary in nature. They are additional courses based on expertise, specialization, requirements, scope, and need of the department. The student has to subscribe any 4 courses in the following list:

Sl. No.	Course Code	Course Title	Semester	Ownership Department	Contact Hours	Credits	Marks
1	23GEU27A	<b>GEC 1:</b> English for Research Writing	I	English	3	2	100
2	23GEU27B	English for Persuasive Communication	I	English	3	2	100
3	23GEU13A	<b>GEC - 2:</b> Biostatistics	II	Mathematics	3	2	50
	23GEU13B	Biostatistics lab	II		2	2	50
4	23GEU14A	Statistics for Bioscience	II	Mathematics	3	2	50
	23GEU14B	Statistics for Bioscience Lab	II		2	2	50

#### Group 5 : Skill Enhancement Courses(SEC)

SEC I : Compulsory Course : Talent Enhancement Course : Career Guidance

SEC II : A Bucket of Skill based Courses are offered for the Under Graduate programmes aimed at imparting advanced skill. A Student has to subscribe one course from list offered by the department.

Courses Offered by Nan Mudhalvan Scheme/Certification in Core Area/Department offered Certification Course.

#### Group 6. Audit Non-Credit Courses (ANCC)

Non-Credit Courses are intended for students who want to gain general knowledge, learn a new skill, upgrade existing skills, enrich their understanding of a wide range of topics, or develop personal interests. A student has to complete any two courses during Semester I and II.

Part IV- ANCC		
S. No.	Course Code	Course Name
Semester I - ANCC 1		

1.	23ANC01	Environmental Studies
<b>Semester II - ANCC 2 - Values &amp; Ethics</b>		
2.	23ANC02	Human Rights
3.	23ANC03	Women's Rights
4.	23ANC04	Yoga for Human Excellence
5.	23ANC05	Indian Culture and Heritage
6.	23ANC06	Introduction to Cyber Security
7.	23ANC07	Consumer Protection
8.	23ANC08	Constitution of India
9.	23ANC09	Waste Management
10.	23ANC10	Cyber Ethics

**Group 7.****i) Drive-Through Course (DTC)I & II– 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.

**1. SWAYAM-NPTEL**

- 4 Additional Credits will be given on submission of the certificate.

**2. Coursera**

- 4 Additional Credits will be given on completion of Specialization Course with 7 – 8 modules
- 3 Additional Credits will be given on completion of Specialization Course with 5 – 6 modules
- 2 Additional Credits will be given on completion of Specialization Course with 3 – 4 modules

**3. Any courses certified by statutory bodies.****ii) Drive-Through Course (DTC – III) – To be Completed****Internship Training/Mini Project/ Spoken Tutorial/Economic Talent test etc.**

Students individually or with the maximum of four members per batch should take up either Internship training or mini project for a period of fifteen days during IV Semester vacation. The report will be evaluated and viva-voce examination will be conducted during 5<sup>th</sup> semester. Otherwise, the students have to complete one spoken tutorial course or any certification course suggested by the department.

## VIII. Semester-wise Scheme

Semester I										
Course Code	Course Title	T/P/E	ESE Dur. Hrs	Ins. Hrs/ Week	CIA Marks	ES Marks	Total Marks	Credits	SD/ EM/ EN	G/ L/ R/ N
23AEC02/ 23AEC07/ 23AEC11	<b>AEC Part I: Language – I:</b> Tamil - I – Language – I Tamil - I – Tamil Aazhi/ Hindi - I/ French – I	T	3	6	25	75	100	3	SD	L/ N/ G
23AEC22	<b>AEC PART II: English I:</b> English for Professional Communication	T	3	4	25	75	100	3	SD	G
23AEC35	<b>AEC Part III:</b> Academic Skills for Bioscience	T	-	2	100	-	100	2	SD	N
23MBU01	<b>DSC - 1:</b> Microbiology	T	3	4	25	75	100	3	SD	G
23MBU02/ 23BTU02	<b>DSC - 2:</b> Biochemistry	T	3	4	25	75	100	3	SD	N
23MBU03	<b>DSC - 3:</b> Lab in Microbiology and Biochemistry	P	3	5	20	30	50	4	SD	N
23GEU27 A	<b>GEC 1</b> English for Research Writing	T	3	3	25	75	100	2	SD	G
23GEU27 B	English for Persuasive Communication									
<b>DTC - I - Additional Credit Courses (NPTEL/Coursera)</b>										
23ANC01	<b>ANCC-1</b> Environmental Studies	T	-	2	-	-	Completed		SD	G
Total				30			650	20		
Semester II										
Course Code	Course Title	T/P/E	ESE Dur. Hrs	Ins. Hrs/ Week	CIA Marks	ES Marks	Total Marks	Credits	SD/ EM/ EN	G/ L/ R/ N
23AEC04/ 23AEC08/ 23AEC12/	<b>AEC Part I: Language – II:</b> Tamil-II – Sudar Tamil/ Hindi II/ French II	T	3	6	25	75	100	3	SD	L/ N/ G
23AEC24	<b>AEC PART II: English II:</b> Campus to Corporate	T	3	4	25	75	100	3	SD	G



23MBU04	<b>DSC 4:</b> Microbial Diversity	T	3	4	25	75	100	3	SD	G
23MBU05	<b>DSC 5:</b> Microbial Physiology and Metabolism	T	3	4	25	75	100	3	SD	G
23MBU06	<b>DSC 6:</b> Lab in Microbial Physiology and Metabolism	P	3	5	20	30	50	4	SD	G
	<b>GEC 2:</b>									
23GEU13A	Biostatistics	T	3	3	10	40	50	2	EN	G
23GEU13B	Biostatistics Lab	P	3	2	10	40	50	2		
23GEU14A	Statistics for Bioscience	T	3	3	10	40	50	2		
23GEU14B	Statistics for Bioscience Lab	P	3	2	10	40	50	2		
<b>DTC II : Additional Credit Courses (NPTEL/Coursera)</b>										
23ANC02 23ANC03 23ANC04 23ANC05 23ANC06 23ANC07 23ANC08 23ANC09 23ANC10	<b>ANCC-2 Value &amp; Ethics:</b> Human Rights Women's Rights Yoga for Human Excellence Indian Culture and Heritage Introduction to Cyber Security Consumer Protection Constitution of India Waste Management* Cyber Ethics	T	-	2	-	-	Completed		EN	R
<b>Total</b>				<b>30</b>			<b>550</b>	<b>20</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 focuses the following needs:				
Needs	G - Global	N - Regional	R - Regional	L - Local
SD	Skill Development			
EM	Employability			
EN	Entrepreneurship			

Seme-ster-wise Distri-butio-n of Mark

**s and Credits:**

Semester	Total Marks	Total Credits
I	650	20
II	550	20

**OFFERED BY (I & II Semesters)**

**List of Courses Offered by English Department**

Seme-ster	Course Code	Course Name	Programme	T/P/E	Ins. hrs	CIA	ES	Total Marks	Credit
I	23GEU27A	English for Research Writing	B.Sc. MB	T	2	25	75	100	2

	23GEU27B	English for Persuasive Communication	B.Sc. MB	T	2	25	75	100	2
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**List of**

**Courses Offered by Mathematics Department**

Semester	Course Code	Course Name	Programme	T/P/E	Ins. hrs	CIA	ES	Total Marks	Credit
II	23GEU13A	Biostatistics	B.Sc. BT	T	3	10	40	50	2
	23GEU13B	Biostatistics Lab	B.Sc. BT	P	2	10	40	50	2
	23GEU14A	Statistics for Bioscience	B.Sc. MB	T	3	10	40	50	2
	23GEU14B	Statistics for Bioscience Lab	B.Sc. MB	P	2	10	40	50	2