

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)

B.Sc. BIOTECHNOLOGY (I to II SEMESTER)

for 2023 - 24 admitted students

DEPARTMENT OF BIOSCIENCE



SRI KRISHNA ARTS AND SCIENCE COLLEGE
COIMBATORE – 641008

DEPARTMENT OF BIOTECHNOLOGY

(2023 - 2024)

I. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	Graduates will be equipped with skills and knowledge and get employment in Bio industries, Pharma Industry, Government departments by imparting the requisite technical skills.
PEO 2	Graduates will be able design, perform experiments, analyse and interpret data for investigating complex problems in biotechnology and related fields
PEO 3	Graduates will be motivated to pursue their higher studies and research in leading universities globally
PEO 4	Graduates will be able to design and innovate solution to Biotechnological problems by applying appropriate tools while keeping in mind safety and ethical factor for environmental and society.

II. PROGRAMME LEARNING OUTCOMES (PLOS)	
No.	The graduates of B.Sc. Biotechnology programme will be able to:
PLO1	Knowledge: An ability to apply knowledge with facts and figures related to various subjects in pure sciences such as Cell biology, Biochemistry, Microbiology, Molecular biology, Bioinstrumentation, Biostatistics, etc. (Cognitive)
PLO2	Critical Thinking: To enable students to propose novel ideas in explaining facts and figures or providing new solution to the problems. (Cognitive)
PLO3	Practical Skills: An ability to acquire skills in handling scientific instruments, planning and performing in laboratory experiments to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability, and sustainability in Biotechnology. (Psychomotor Skills)
PLO4	Team Work Skills: An ability to work as a member of multidisciplinary teams and understand team members. (Affective)
PLO5	Communication Skills: Students will communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing. (Affective)
PLO6	Digital Skill: Serve as the Programmers, with sound knowledge of practical and theoretical concepts for developing molecular imaging. (Affective)
PLO7	Numeracy Skills: An ability to conduct experiments, as well as to analyze data with numeracy and statistical skills, understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life. (Cognitive)
PLO8	Leadership Skills: Ability to lead oneself and others in the achievement of organizational goals, contributing effectively to a team environment. (Affective)
PLO9	Life Long Learning: Interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments, recognition of the need for, and an ability to engage in life-long learning. (Affective)
PLO10	Entrepreneur Skills: Ability to develop different functional aspects of business world and convert the opportunities in establishing the Bio-business. (Affective)
PLO11	Ethics and Professionalism: Apply ethical Principles and Commit to professional ethics, responsibilities and norms of the biological sciences practice. (Affective)

III. PROGRAMME LEARNING OUTCOMES VS GRADUATE ATTRIBUTES VS TAXONOMY 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)

APO 1	Imparting knowledge of biotechnology applications in core and related areas, including molecular and microbiology, immunology and genetic engineering, bioprocess and fermentation, enzyme and food technology, and bioinformatics.
APO 2	To equip students with concepts and research methodologies for their future careers in biotechnology while also developing their scientific curiosity.
APO 3	To provide students with in-depth practical expertise in several thrust areas of biotechnology in order to fulfil the demands of industry and academia.
APO 4	Enhancing the ability to think independently, engage in self-directed learning, and use problem-solving techniques
APO 5	Demonstrate ability to apply contemporary analytical tools/software/equipment, as well as analyse and solve issues in diverse biotechnology courses.

VI. PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO 1	Apply knowledge to find innovative solution and explore problems related to Biotechnology to provide valid solutions through industry – academic interface
PSO 2	Infer the potential and impact from Biotechnological innovations for finding sustainable solutions for issues pertaining to health and public health including pandemic, environment, waste management and agriculture.

VII. Curriculum Structure for B.Sc. Biotechnology**Course Components, Credits & Marks Distribution**

Part No	Group	Basic Structure: Distribution of Courses	Number of Courses	Total Marks	Total Credits
I - III	1	AEC – Ability Enhancement Courses	10	1000	24
III & IV	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
Total				4000	140

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

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	AEC Part I: Language – I Tamil - I – Tamil Aazhi/ Hindi - I/ French - I	I	Language Dept.	6	3	100
2	23AEC22	AEC Part II: English - I: English for Professional Communication	I	English Dept.	4	3	100
3	23AEC35	AEC Part III: Academic Skills for Bioscience	I	Bioscience Dept.	2	2	100
4	23AEC04/ 23AEC08/ 23AEC12	AEC Part I: Language – II Tamil - II – Sudar Tamil/ Hindi - II/ French - II	II	Language Dept.	6	3	100
5	23AEC24	AEC Part II: English – II: Campus to Corporate	II	English Dept	4	3	100

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

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	23BTU01	DSC 1: Cell Biology	I	4	3	100
2	23BTU02/ 23MBU02	DSC 2: Biochemistry	I	4	3	100
3	23BTU03	DSC 3: Lab in Cell Biology and Biochemistry	I	5	4	50
4	23BTU04	DSC 4: Microbiology	II	4	3	100
5	23BTU05	DSC 5: Genetics	II	4	3	100
6	23BTU06	DSC 6: Lab in Microbiology and Genetics	II	5	4	50

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

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 TEN courses from the following list.

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

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

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	GEC 1: English for Research Writing	I	English	3	2	100
2	23GEU27B	English for Persuasive Communication					
3	23GEU13A	GEC 2: Biostatistics	II	Mathematics	3	2	50
	23GEU13B	Biostatistics lab			2	2	50
4	23GEU14A	Statistics for Bioscience	II	Mathematics	3	2	50
	23GEU14B	Statistics for Bioscience Lab			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
Semester II - ANCC 2 - Values & Ethics		
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 5th 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	AEC Part I: Language – I: Tamil - I – Tamil Aazhi/ Hindi - I/ French – I	T	3	6	25	75	100	3	SD	L	
									SD	N	
									SD	G	
23AEC22	AEC Part II: English - I: English for Professional Communication	T	3	4	25	75	100	3	SD	G	
23AEC35	AEC Part III: Academic Skills for Bioscience	T	-	2	100	-	100	2	SD	N	
23BTU01	DSC 1: Cell Biology	T	3	4	25	75	100	3	SD	G	
23BTU02/ 23MBU02	DSC 2: Biochemistry	T	3	4	25	75	100	3	SD	N	
23BTU03	DSC 3: Lab in Cell Biology and Biochemistry	P	3	5	20	30	50	4	SD	N	
23GEU27A	GEC 1: English for Research Writing	T	3	3	25	75	100	2	SD	G	
23GEU27B	English for Persuasive Communication										
DTC I - Additional Credit Courses (NPTEL/Coursera)											
23ANC01	ANCC - 1 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	AEC Part I: Language – II: Tamil - II – Sudar Tamil/ Hindi - II/ French – II	T	3	6	25	75	100	3	SD	L	
										N	
										G	
23AEC24	AEC PART II: English II: Campus to Corporate	T	3	4	25	75	100	3	SD	G	

23BTU04	DSC 4: Microbiology	T	3	4	25	75	100	3	SD	G
23BTU05	DSC 5: Genetics	T	3	4	25	75	100	3	SD	G
23BTU06	DSC 6: Lab in Microbiology and Genetics	P	3	5	20	30	50	4	SD	G
23GEU13A	GEC 2: 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		

DTC II : Additional Credit Courses (NPTEL/Coursera)

23ANC02 23ANC03 23ANC04 23ANC05 23ANC06 23ANC07 23ANC08 23ANC09 23ANC10	ANCC-2 Value & Ethics: 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
Total				30			550	20		
Drive-Through Course (DTC): 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 - National	R - Regional	L - Local
SD	Skill Development			
EM	Employability			
EN	Entrepreneurship			

Semester-wise Distribution of Marks 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**

Sem	Course Code	Course Name	Programme	T/P/E	Ins. hrs	CIA	ES	Total Marks	Credit
I	23GEU27A	English for Research Writing	B.Sc. BT/ B.Sc. MB	T	3	25	75	100	2
	23GEU27B	English for Persuasive Communication							

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

OFFERED TO (I & II Semesters)**List of Courses Offered to Catering Science and Hotel Management Department**

Sem	Course Code	Course Name	Programme	T/P/E	Ins. hrs	CIA	ES	Total Marks	Credit
II	23GEU25A	Nutrition and Dietetics	B.Sc. CSHM	T	3	25	75	100	3
II	23GEU25B	Food Waste Management							