

SRI KRISHNA ARTS AND SCIENCE COLLEGE

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

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

**M.Sc. Software Systems
(I to VI Semester)**

for 2022-23 admitted students

DEPARTMENT OF COMPUTER SCIENCE



**SRI KRISHNA ARTS AND SCIENCE COLLEGE
COIMBATORE – 641008
DEPARTMENT OF COMPUTER SCIENCE**

I. Programme Educational Objectives (PEOs)

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

PEO 1	Able to become a software architect for designing systems with research in the contemporary software platforms.
PEO 2	Become a team leader and work with a group in solving complex problems through domain knowledge with effective communication skills.
PEO 3	Able to keep up-to-date information in advanced field for lifelong learning by providing professional services with competence.
PEO 4	Able to demonstrate ethical and professional values in providing services including entrepreneurial skills.

II. Programme Learning Outcomes (PLOs)

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

PLO 1	Knowledge: Acquire knowledge in the core theoretical and practical concepts in the computer science domain. (Cognitive)
PLO 2	Critical Thinking Skills: Able to critically think, analyse and provide feasible solutions to real life problems in computing area. (Cognitive)
PLO 3	Practical Skills: Acquire proficiency in the key areas of computer science like object oriented programming, mobile and open source technologies (Psychomotor)
PLO 4	Team-work Skills: Function effectively as a member and leader in a team, to manage projects and in multidisciplinary environments. (Affective)
PLO 5	Communication Skills: Communicate effectively while developing and presenting effective solutions to the problems. (Affective)
PLO 6	Digital Skills: Select and apply appropriate techniques, resources, tools for prediction and providing solutions to complex real time problems. (Affective)

PLO 7	Numeracy Skills: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems. (Cognitive)
PLO 8	Leadership Skills: An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems. (Affective)
PLO 9	Lifelong Learning Skills: An ability to engage in life-long learning in the context of technological change. (Affective)
PLO 10	Entrepreneurial Skills: Acquire skills to design, develop and provide effective solutions to become an entrepreneur. (Affective)
PLO 11	Ethics & Professional Skills: Apply ethical principles and commit to professional ethics and social responsibilities. (Affective)

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

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

Mapping of PEOs and PLOs

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

Additional Programme Outcomes (APOs)

The Additional Programme Outcomes for M.Sc. Software Systems are:

APO 1	Ability to build networks and broaden horizons and engaging authentically through Social Intelligence Quotient and Emotional Quotient.
APO 2	Ability to translate vast data into abstract concepts and to understand data base reasoning.
APO 3	Ability to develop working in virtual collaborating platforms to transfer different types of information and work towards a common goal
APO 4	Ability to develop critical thinking and innovative skills as a potential to advance career.
APO 5	Having a good digital foot print.

Programme Specific Outcomes (PSOs)

On the completion of M.Sc. Software Systems, the graduates will able to

PSO 1	Ability to use software development tools, computing platforms and other advanced tools for lifelong learning.
PSO 2	Ability to apply computing knowledge to produce effective designs and solutions for real-time applications.

Curriculum Structure for M.Sc. Software Systems

Course Components, Credits & Marks Distribution

Course Type	Number of Courses	Credits per Course	Total Credits	Marks	Semester
Discipline Specific Courses (DSC)	47	1-5	165	4400	I to X
Discipline Specific Elective Courses (DSE)	4/8	2-5	15	400	VIII & IX
Generic Electives Courses (GEC)	7	2-4	19	700	I to III
Mini Project/Project	3	8-15	35	500	VI, VII & X
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 X
Total			234	6000	

Discipline Specific Courses (DSC)

These courses are to be studied compulsorily by the students as a core requirement. The students are required to take DSCs across four semesters. 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.	22SSI01	DSC 1: English	I	4	3	100
2.	22SSI02	DSC 2: C Programming	I	5	4	100
3.	22SSI03	DSC 3: Algebra for Software Systems	I	4	3	100
4.	22SSI04	DSC 4: Computer Organization and Architecture	I	5	4	100
5.	22SSI05	DSC 5: Practical - Programming Lab- C	I	4	3	100
6.	22SSI06	DSC 6: Self Study Paper -PC Software Lab	I	1	1	50
7.	22SSI07	DSC 7: Calculus and Applications	II	4	3	100
8.	22SSI08	DSC 8: Object Oriented Programming using C++	II	5	4	100
9.	22SSI09	DSC 9: Data Structures and Algorithms	II	5	4	100
10.	22SSI10	DSC 10: Practical- C++ with Data Structures Lab	II	4	3	100
11.	22SSI11	DSC 11: Numerical and Statistical Methods	III	4	4	100
12.	22SSI12	DSC 12: Computer Networks	III	5	5	100
13.	22SSI13	DSC 13: Python Programming	III	4	4	100
14.	22SSI14	DSC 14: System Software and Operating System	III	4	4	100
15.	22SSI15	DSC 15: Practical- Python Programming Lab	III	3	2	100

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
16.	22SSI16	DSC 16: Practical-System Software Lab (C & C++)	III	3	2	100
17.	22SSI17	DSC 17: Discrete Structures	IV	4	4	100
18.	22SSI18	DSC 18: Java Programming	IV	5	5	100
19.	22SSI19	DSC 19: Database Management Systems	IV	5	5	100
20.	22SSI20	DSC 20: Compiler Design	IV	5	5	100
21.	22SSI21	DSC 21: Practical - Java Programming Lab	IV	4	3	100
22.	22SSI22	DSC 22: Practical-Database Management Systems Lab	IV	4	2	100
23.	22SSI23	DSC 23: Practical-Compiler Design Lab	IV	3	2	100
24.	22SSI24	DSC 24: Operations Research	V	4	4	100
25.	22SSI25	DSC 25: Design and Analysis of Algorithms	V	5	4	100
26.	22SSI26	DSC 26: Web Technology	V	5	5	100
27.	22SSI27	DSC 27: Advanced Java Programming	V	4	4	100
28.	22SSI28	DSC 28: Practical - Algorithm Lab	V	4	2	50
29.	22SSI29	DSC 29: Practical-J2EE Lab	V	4	3	100
30.	22SSI30	DSC 30: Practical - Web Technology Lab	V	4	2	50
31.	22SSI31	DSC 31: Software Engineering	VI	4	4	100
32.	22SSI32	DSC 32: Advanced Web Technology	VI	5	5	100
33.	22SSI33	DSC 33: Android Programming	VI	5	5	100

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
34.	22SSI34	DSC 34: Distributed Operating Systems	VI	5	5	100
35.	22SSI35	DSC 35: Practical - Advanced Web Technology Lab	VI	4	2	50
36.	22SSI36	DSC 36: Practical - Application Development Using Android	VI	4	3	100
37.	22SSI37	DSC 37: Self Study Paper: Practical-UML and CASE Tools	VI	1	1	50
38.	22SSI40	DSC 38: Data Mining and Warehousing	VIII	5	4	100
39.	22SSI41	DSC 39: Linux Programming	VIII	5	5	100
40.	22SSI42	DSC 40: Software Testing	VIII	5	5	100
41.	22SSI43	DSC 41: Practical - Linux Programming	VIII	3	2	50
42.	22SSI44	DSC 42: Practical - Software Testing Lab	VIII	3	2	100
43.	22SSI49	DSC 43: Digital Image Processing	IX	5	5	100
44.	22SSI50	DSC 44: Cryptography and Network Security	IX	5	5	100
45.	22SSI51	DSC 45: Cloud Computing	IX	4	3	100
46.	22SSI52	DSC 46: Practical - Image Processing Lab	IX	4	3	100
47.	22SSI53	DSC 47: Practical - Cryptography Lab	IX	4	3	100
Total					165	4400

Project Work

During the Six semester, each of the students has to undertake a Minin Project Work individually. A guide will be allotted to each student by the department. Student can select any relevant topic in discussion with the guide. The project report shall be subject to internal evaluation followed by a viva-voce. The project should be demonstrated at the time of examination.

Mark Distribution: Mini Project*

First Review	20 Marks
Second Review	20 Marks
Work Diary	10 Marks

	50 Marks

Total - 100 Marks will be converted to 50 (Internal) Marks
 End Semester Viva-Voce will be conducted for 50 (External) Marks.
 (Dissertation - 25 Marks & Viva-voce - 25 Marks)

During the seventh and tenth semester, every student shall prepare a Major Project report. A guide will be allotted to each student by the department. Student can select any topic in discussion with the guide. The project report shall be subjected to internal evaluation followed by a Viva Voce.

Mark Distribution: Major Project**

First Review	20 marks
Second Review	20 Marks
Third Review	20 Marks
Fourth Review	20 Marks
Work Diary	20 Marks

	100 Marks

Total - 200 Marks will be converted to 100 (Internal) Marks
 End Semester Viva-Voce will be conducted for 100 (External) Marks.
 (Dissertation - 50 Marks & Viva-voce - 50 Marks)

Discipline Specific Electives (DSE) (3 Courses)

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 ONE Group from the following list.

Group	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
I	22SSI45	Option I – Computer Graphics	VIII	5	5	100
	22SSI47	Option II - Practical Computer Graphics Lab		4	3	100
	22SSI54	Option III - Animation Techniques		5	5	100

	22SSI56	Option IV - Practical - Animation Lab		3	2	100
II	22SSI46	Option I - Machine Learning	IX	5	5	100
	22SSI48	Option II - Machine Learning Using R		4	3	100
	22SSI55	Deep Learning		5	5	100
	22SSI57	Deep Learning Lab		3	2	100
	Total				15	400

Generic Elective Courses (GEC) (7 Courses)

Generic Elective Courses are interdisciplinary in nature. They are additional courses based on expertise, specialization, requirements, scope, and need of the department. The students will have the choice of taking THREE GECs.

List of Courses Offered by ECS Department

EM	Course Code	Course Title	T/P	Ins. Hrs/ week	Examination			Credits	SD/ EM/ EN	L/ R/ N/ G	
					Dur. Hrs	CIA	ES				Total Marks
Group – I											
I	22GEP19	Digital Electronics	T	4	3	50	50	100	3	SD	G
I	22GEP20	Digital Electronics Lab	P	3	3	50	50	100	2	SD	G
II	22GEP21	Embedded Systems	T	4	3	50	50	100	3	EM	G
II	22GEP22	Embedded Systems Lab	P	3	3	50	50	100	2	EM	G
III	22GEP23	Internet of Things	T	4	3	50	50	100	3	EN	G
III	22GEP24	Internet of Things Lab	P	3	3	50	50	100	2	EN	G
Group – II											
I	22GEP32	VLSI Design and Verilog	T	4	3	50	50	100	3	SD	G
I	22GEP33	Verilog Programming Lab	P	3	3	50	50	100	2	SD	G
II	22GEP34	Programmable Logic Controller	T	4	3	50	50	100	3	EM	G
II	22GEP35	Programmable Logic Controller Lab	P	3	3	50	50	100	2	EM	G

III	22GEP36	Robotics Programming	T	4	3	50	50	100	3	EN	G
III	22GEP37	Robotics Programming Lab	P	3	3	50	50	100	2	EN	G

List of Courses Offered by B.Com. CA Department

SEM	Course Code	Course Title	T/P	Ins.		Examination			Credits	SD/EM/EN	L/R/N/G
				Hrs/week	Dur. Hrs	CIA	ES	Total Marks			
II	22GEP31	Fundamentals of Accounting	T	4	3	50	50	100	4	SD	G

List of Courses Offered toMSW Department

SEM	Course Code	Course Title	T/P	Ins.		Examination			Credits	SD/EM/EN	L/R/N/G
				Hrs/week	Dur. Hrs	CIA	ES	Total Marks			
III	22GEP18	Excel Macro Lab	P	4	3	50	50	100	4	SD	G

4. Drive Through Course (DTC)

i. (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.

ii. (DTC – III) – Article Publication - To be Completed

Students individually or with the maximum of four members per batch are asked to publish article in Scopus or Web of Science Journals (Or) publish book chapters. Additional 4 credits per Course will be given on submission of proof of the published paper (or) book chapter.

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	CI A	ES	Total Marks			
22SSI01	DSC 1: English	T	4	3	50	50	100	3	SD	G
22SSI02	DSC 2: C Programming	T	5	3	50	50	100	4	SD / EM	G
22SSI03	DSC 3: Algebra for Software Systems	T	4	3	50	50	100	3	SD	G
22SSI04	DSC 4: Computer Organization and Architecture	T	5	3	50	50	100	4	SD	G
22SSI05	DSC 5: Practical - Programming Lab- C	P	4	3	50	50	100	3	SD / EM	G
22SSI06	DSC 6: Self Study Paper -PC Software Lab	P	1	3	-	50	50	1	SD	G
22GEP19	GEC 1: Digital Electronics	T	4	3	50	50	100	3	SD	G
22GEP20	GEC 2: Digital Electronics Lab	P	3	3	50	50	100	2	SD	G
DTC I - Additional Credit Courses (Coursera)										
Total			30				750	23		
Semester II										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R / N/ G
				Dur · Hrs	CI A	ES	Total Marks			
22SSI07	DSC 7: Calculus and Applications	T	4	3	50	50	100	3	SD	G
22SSI08	DSC 8: Object Oriented Programming using C++	T	5	3	50	50	100	4	SD / EM	G
22SSI09	DSC 9: Data Structures and Algorithms	T	5	3	50	50	100	4	SD	G
22SSI10	DSC 10: Practical- C++ with Data Structures Lab	P	4	3	50	50	100	3	SD / EM	G
22GEP21	GEC 3: Embedded Systems	T	4	3	50	50	100	3	SD	G

22GEP22	GEC 4: Embedded Systems Lab	P	3	3	50	50	100	2	EM	G
22GEP31	GEC 5: Fundamentals of Accounting	T	5	3	50	50	100	4	EM	G
DTC II - Additional Credit Courses (NPTEL)										
Total			30				700	23		
Semester III										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R / N/ G
				Dur · Hrs	CI A	ES	Total Marks			
22SSI11	DSC 11: Numerical and Statistical Methods	T	4	3	50	50	100	4	SD	G
22SSI12	DSC 12: Computer Networks	T	5	3	50	50	100	5	SD	G
22SSI13	DSC 13: Python Programming	T	4	3	50	50	100	4	SD / EM	G
22SSI14	DSC 14: System Software and Operating System	T	4	3	50	50	100	4	SD	G
22SSI15	DSC 15: Practical-Python Programming Lab	P	3	3	50	50	100	2	SD / EM	G
22SSI16	DSC 16: Practical-System Software Lab (C & C++)	P	3	3	50	50	100	2	SD	G
22GEP23	GEC 6: Internet of Things	T	4	3	50	50	100	3	EN	G
22GEP24	GEC 7: Internet of Things Lab	P	3	3	50	50	100	2	EN	G
Total			30				800	26		

Semester IV										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R / N/ G
				Dur · Hrs	CI A	ES	Total Marks			
22SSI17	DSC 17: Discrete Structures	T	4	3	50	50	100	4	SD	G
22SSI18	DSC 18: Java Programming	T	5	3	50	50	100	5	SD / EM	G
22SSI19	DSC 19: Database Management Systems	T	5	3	50	50	100	5	SD / EM	G
22SSI20	DSC 20: Compiler Design	T	5	3	50	50	100	5	SD	G
22SSI21	DSC 21: Practical - Java Programming Lab	P	4	3	50	50	100	3	SD / EM	G
22SSI22	DSC 22: Practical- Database Management Systems Lab	P	4	3	50	50	100	2	SD / EM	G
22SSI23	DSC 23: Practical- Compiler Design Lab	P	3	3	50	50	100	2	SD	G
Total			30				700	26		
Semester V										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R / N/ G
				Dur · Hrs	CI A	ES	Total Marks			
22SSI24	DSC 24: Operations Research	T	4	3	50	50	100	4	SD	G
22SSI25	DSC 25: Design and Analysis of Algorithms	T	5	3	50	50	100	4	SD	G
22SSI26	DSC 26: Web Technology	T	5	3	50	50	100	5	SD	G
22SSI27	DSC 27: Advanced Java Programming	T	4	3	50	50	100	4	EN	G
22SSI28	DSC 28: Practical - Algorithm Lab	P	4	3	25	25	50	2	SD	G
22SSI29	DSC 29: Practical- J2EE Lab	P	4	3	50	50	100	3	EN	G
22SSI30	DSC 30: Practical - Web Technology Lab	P	4	3	25	25	50	2	SD	G
Total			30				600	24		

Semester VI										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R/N/G
				Dur · Hrs	CI A	ES	Tota l Marks			
22SSI31	DSC 31: Software Engineering	T	4	3	50	50	100	4	SD	G
22SSI32	DSC 32: Advanced Web Technology	T	5	3	50	50	100	5	EN	G
22SSI33	DSC 33: Android Programming	T	5	3	50	50	100	5	EN	G
22SSI34	DSC 34: Distributed Operating Systems	T	5	3	50	50	100	5	SD	G
22SSI35	DSC 35: Practical - Advanced Web Technology Lab	P	4	3	25	25	50	2	EN	G
22SSI36	DSC 36: Practical - Application Development Using Android	P	4	3	50	50	100	3	EN	G
22SSI37	DSC 37: Self Study Paper: Practical-UML and CASE Tools	P	1	3	-	50	50	1	SD	G
22SSI38	Mini Project Work and Viva Voce	-	2	-	50	50	100*	8	SD / EM / EN	G
Total			30				700	33		
Semester VII										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R/N/G
				Dur · Hrs	CI A	ES	Tota l Marks			
22SSI39	Project Work (6 months)	-	-	-	100	100	200*	12	SD / EM / EN	G
DTC III – Paper Publications / Book Publications										
Total			-				200	12		

Semester VIII										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R/N/G
				Dur . Hrs	CIA	ES	Total Marks			
22SSI40	DSC 38: Data Mining and Warehousing	T	5	3	50	50	100	4	SD	G
22SSI41	DSC 39: Linux Programming	T	5	3	50	50	100	5	SD	G
22SSI42	DSC 40: Software Testing	T	5	3	50	50	100	5	SD /E M	G
22SSI43	DSC 41: Practical - Linux Programming	P	3	3	25	25	50	2	SD	G
22SSI44	DSC 42: Practical - Software Testing Lab	P	3	3	50	50	100	2	SD /E M	G
22SSI45/ 22SSI46	DSE 1/2: Option I - Computer Graphics / Machine Learning	T	5	3	50	50	100	5	SD /E M	G
22SSI47 / 22SSI48	DSE 3/4: Option II - Practical Computer Graphics Lab/ Machine Learning Using R	P	4	3	50	50	100	3	SD /E M	G
Total			-				650	26		
Semester IX										
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R/N/G
				Dur . Hrs	CIA	ES	Total Marks			
22SSI49	DSC 43: Digital Image Processing	T	5	3	50	50	100	5	SD	G
22SSI50	DSC 44: Cryptography and Network Security	T	5	3	50	50	100	5	SD	G
22SSI51	DSC 45: Cloud Computing	T	4	3	50	50	100	3	SD /E M	G
22SSI52	DSC 46: Practical - Image Processing Lab	T	4	3	50	50	100	3	SD	G
22SSI53	DSC 47: Practical - Cryptography Lab	P	4	3	50	50	100	3	SD	G
22SSI54/ 22SSI55	DSE 5/6: Option III - Animation Techniques/ Deep Learning	P	5	3	50	50	100	5	SD /E M	G

22SSI56/ 22SSI57	DSE 7/8: Option IV - Practical -Animation Lab / Deep Learning Lab	T	3	3	50	50	100	2	SD /E M	G	
Total			30				700	26			
Semester X											
Course Code	Course Title	T / P	Ins. Hrs/ week	Examination				Credits	SD / EM / EN	L/R/ N/G	
				Dur . Hrs	CIA	ES	Total Marks				
22SSI58	Project Work (6 months)	-	-	-	100	100	200**	15	SD / EM / EN	G	
Total			30				200	15			
Total							6000	234			
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 VI			

The Courses focus on the following needs	
SD	Skill Development
EM	Employability
EN	Entrepreneurship
L	Local
R	Regional
N	National
G	Global

Semester-wise Distribution

Semester	Total Marks	Total Credits
I	750	23
II	700	23
III	800	26
IV	700	26
V	600	24
VI	700	33
VII	200	12
VIII	650	26

IX	700	26
X	200	15
Total	6000	234
