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. MATHEMATICS WITH BIG DATA
(I to IV Semesters)

for 2024-25 admitted students

DEPARTMENT OF MATHEMATICS

SRI KRISHNA ARTS AND SCIENCE COLLEGE
COIMBATORE – 641008
DEPARTMENT OF MATHEMATICS
(2024-2025)

I. Programme Educational Objectives (PEOs)

Post Graduates from the M.Sc Mathematics with Big Data Programme are expected to achieve the following PEOs within three to five years of graduation

PEO 1	Graduates will be able to become Knowledgeable in multi-disciplinary area by applying Mathematical skills through analysis, interpretation and formulation of research knowledge.
PEO 2	Graduates will be able to apply up to date information in problem solving through numerical knowledge for lifelong learning and provide professional services with competence.
PEO 3	Graduates will be able to perform as a team leader and work with a group in solving complex problems through up- to date domain knowledge including the interdisciplinary fields by applying information from various sources effectively.
PEO 4	Graduates will be able to demonstrate ethical and professional values in providing services in the relevant field including entrepreneurial skills.

II. Programme Learning Outcomes (PLOs)

The following Programme Learning Outcomes have been identified for M.Sc. Mathematics with Big Data:

PLO 1	**Knowledge:** Describe the theoretical concepts and conventions through wider knowledge related to the current trends.**(Cognitive)**
PLO 2	**Critical Thinking:** Develop skills in logical thinking and resolving complex problems through critical thinking skills.**(Cognitive)**
PLO 3	**Practical Skills:** Establish technical and operational skills in solving the multidisciplinary tasks related to current areas of research in the field.**(Psychomotor)**
PLO 4	**Teamwork Skills:** Form as a team in generating competitive decisions through projects in the field of Mathematics and strive for excellence.**(Affective)**
PLO 5	**Communication Skills:** Apply scientific approach and capability to undertake responsibilities for sustainable growth in professional by ensuring effective communication both in verbal and nonverbal form.**(Affective)**
PLO 6	**Digital Skills:** Using wide range of information, media and technological application and utilizing the recent social and digital

	skills platform in solving the current issues in the field of Mathematics.**(Affective)**	
PLO 7	**Numeracy Skills:** Apply quantitative, numerical and statistical skills through the visual and graphical aids for related problems in order to develop research based knowledge. **(Cognitive)**	
PLO 8	**Leadership Skills:** Progressively adopt effective leadership skills to work efficiently in a competitive domestic and global environment. **(Affective)**	
PLO 9	**Life Long Learning:** Display the skills and principles of lifelong learning in their academic, career, research development and contribute to the economic growth of a country.**(Affective)**	
PLO 10	**Entrepreneurial Skills:** Enhance entrepreneurial skills and professional development through consultancy and extension services at a competitive level.**(Affective)**	
PLO 11	**Ethics and Professionalism**: Progressively adopt and appreciate professional ethics also commit professionally, ethically, and independently with the ultimate responsibility in line with code of conduct in related field.**(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 & Professionali	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. Mathematics with Big Data are:

APO 1	Ability to build lasting network and broaden horizons through IQ and EQ.
APO 2	Ability to interpret vast data into set of equations in order to understand data base reasoning, and finding optimal solution.
APO 3	Ability to correlate different branches of subject to transfer various types of information by working in virtual collaborating platforms 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.

VI. Programme Specific Outcomes (PSOs)

On the completion of M.Sc. Mathematics with Big Data, the graduates will able to

PSO 1	Graduates will be able to design innovative solution to the critical problems in the areas of Mathematics, Statistics and Computer Science with social and ethical dimensions.
PSO 2	Graduates will be able to handle big data and formulate competitive strategies.
PSO 3	Graduates will be able to develop theory and relevant research output with data visualization which will help to solve the problems relating to industries.

VII. Curriculum Structure for M.Sc. Mathematics with Big Data
Course Components, Credits & Marks Distribution

Course Type	Number of Courses	Credits per Course	Total Credits	Marks	Semester
Discipline Specific Courses (DSC)	20	2-6	72	1850	I to IV
Discipline Specific Elective Courses (DSE)	2	5	10	200	I & II

Generic Electives Courses **(GEC)**		2	2-4	8	200	I & II
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
Total				**90**	**2250**	

1. Discipline Specific Courses (DSC) (20 Courses)

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	24MAP01	**DSC- 1:** Computational Linear Algebra	I	6	4	100
2	24MAP02	**DSC-2:** Ordinary Differential Equations	I	6	4	100
3	24MAP05	**DSC-3:** Inferential Statistics	I	5	4	100
4	24MAP06	**DSC-4:** Practical - Statistical Software for Data Analysis - I	I	2	2	50
5	24MAP07	**DSC-5:** Real Analysis	II	6	4	100
6	24MAP08	**DSC-6:** Algebra	II	6	4	100
7	24MAP09	**DSC- 7:** Partial Differential Equations	II	7	4	100
8	24MAP10	**DSC-8:** Self – Study: Excel Macros and Python	II	3	2	50
9	24MAP13	**DSC-9:** Complex Analysis	III	6	4	100
10	24MAP14	**DSC-10:** Predictive Machine Learning	III	6	4	100
11	24MAP15	**DSC-11:** Advanced Operations Research	III	6	4	100
12	24MAP16	**DSC-12:** Fluid Dynamics	III	5	4	100
13	24MAP17	**DSC-13:** Mini Project	III	2	2	50
14	24MAP18	**DSC-14:** Big Data Analytics	III	3	2	50
15	24MAP19	**DSC-15:** Practical - Data Visualization Lab	III	2	2	50

16	24MAP20	**DSC-16:** Mathematical Methods	IV	6	4	100
17	24MAP21	**DSC-17:** Topology and Functional Analysis	IV	6	4	100
18	24MAP22	**DSC-18:** Fuzzy Logic and Systems	IV	6	3	100
19	24MAP23	**DSC-19:** Graph Theory	IV	6	3	100
20	24MAP24	**DSC- 20:** Project Work and Viva Voce	IV	6	8	200
Total					**72**	**1850**

Project Work

During the fourth semester, each of the students has to undertake a 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.

3 Reviews   – 60 Marks
Report   – 20 Marks
Attendance   – 20 Marks
Total   – 100 (Internal) Marks
End Semester Viva-Voce will be conducted for 100 (External) Marks.
(Dissertation - 50 Marks & Viva-voce - 50 Marks)

2. Discipline Specific Electives (DSE) (2 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 TWO courses from the following list. Students can opt one course from each group.

S. No.	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
1	24MAP03	Numerical Analysis	I	5	5	100
	24MAP04	Statistical Data Analysis				
2	24MAP11	Practical – Programming using Scilab	II	5	5	100
	24MAP12	Practical – Statistical Software for Data Analysis - II				
Total					10	200

3. Generic Elective Courses (GEC) (2 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 TWO GECs.

List of Courses Offered by Computer Science Department

Group	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
I	24GEP23	**GEC-1**: RDBMS using Oracle	I	4	2	50
	24GEP24	**GEC-2:** RDBMS using Oracle Lab	I	2	2	50
II	24GEP25	**GEC-3**: Data Mining and Data warehousing	II	4	4	100
Total					**8**	**200**

List of Core Courses Offered by Computer Science Department

Group	Course Code	Course Title	Semester	Contact Hours	Credits	Marks
I	24MAP18	**DSC 14**: Big Data Analytics	III	3	2	50
	24MAP19	**DSC 15:** Practical – Data Visualization Lab	III	2	2	50
Total					**4**	**100**

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.

> a. SWAYAM-NPTEL
> b. Coursera
> c. Any courses certified by statuary 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.

Mini Project

24MAP17 Mini Project – The students can opt any one of the following course.

Option 1 - Research paper presented at university level

(Minimum of two research papers should be presented)

Option 2 – Consolidated research project / Professional bodies / reputed journal research

Student can choose the option after the approval of the internal supervisor allotted by the department. Marks (2*25=50 Marks) are based on the grade given by the internal supervisor. A consolidated report has to be submitted for 100% internal evaluation followed by a viva-voce at the end of III semester. A committee of three members will consolidate and send the marks to the controller of examinations at the end of the semester

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			
24MAP01	**DSC- 1:** Computational Linear Algebra	T	6	3	25	75	100	4	EN	G
24MAP02	**DSC- 2:** Ordinary Differential Equations	T	6	3	25	75	100	4	SD	G
24MAP03/ 24MAP04	**DSE – 1:** Numerical Analysis / Statistical Data Analysis	T	5	3	25	75	100	5	EM	G
24MAP05	**DSC – 3:** Inferential Statistics	T	5	3	25	75	100	4	EM	G
24MAP06	**DSC – 4:** Practical - Statistical Software for Data Analysis – I	P	2	3	20	30	50	2	EM	G
24GEP23	**GEC - 1:** RDBMS using Oracle	T	4	3	10	40	50	2	EM	G
24GEP24	**GEC – 2:** RDBMS using Oracle Lab	P	2	3	20	30	50	2	EM	G
DTC I - Additional Credit Courses (NPTEL/ Coursera)										
Total			**30**				**550**	**23**		

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			
24MAP07	**DSC-5:** Real Analysis	T	6	3	25	75	100	4	SD	G
24MAP08	**DSC-6:** Algebra	T	6	3	25	75	100	4	SD	G
24MAP09	**DSC- 7:** Partial Differential Equations	T	6	3	25	75	100	4	SD	G
24MAP10	**DSC-8:** Self – Study - Excel Macros and Python	P	3	3	-	50	50	2	EM	G

24MAP11/ 24MAP12	**DSE- 2:** Practical - Programming using Scilab / Practical - Statistical Software for Data Analysis - II	P	5	3	40	60	100	5	EN	G
24GEP25	**GEC- 3:** Data Mining and Data Warehousing	T	4	3	25	75	100	4	EN	G
DTC II - Additional Credit Courses (NPTEL/ Coursera)										
Total			**30**				**550**	**23**		

Semester III

Course Code	Course Title	T/P	Ins. Hrs/ week	Examination				Credits	SD/ EM/ EN	L/ R/ N/ G
				Dur. Hrs	CIA	ES	Total Marks			
24MAP13	**DSC-9:** Complex Analysis	T	6	3	25	75	100	4	SD	G
24MAP14	**DSC-10:** Predictive Machine Learning	T	6	3	25	75	100	4	EM	G
24MAP15	**DSC-11:** Advanced Operations Research	T	6	3	25	75	100	4	SD	N
24MAP16	**DSC-12:** Fluid Dynamics	T	5	3	25	75	100	4	SD	N
24MAP17	**DSC-13:** Mini Project	T	2	-	50	-	50	2	EN	G
24MAP18	**DSC-14:** Big Data Analytics	T	3	3	10	40	50	2	EM	G
24MAP19	**DSC-15:** Practical - Data Visualization Lab	P	2	3	20	30	50	2	EM	G
Total			**30**				**550**	**22**		

Semester IV

Course Code	Course Title	T/P	Ins. Hrs/ week	Examination				Credits	SD/ EM/ EN	L/R/ N/G
				Dur. Hrs	CIA	ES	Total Marks			
24MAP20	**DSC-16:** Mathematical Methods	T	6	3	25	75	100	4	SD	N
24MAP21	**DSC-17:** Topology and Functional Analysis	T	6	3	25	75	100	4	SD	N
24MAP22	**DSC-18:** Fuzzy Logic and Systems	T	6	3	25	75	100	3	SD	G
24MAP23	**DSC-19:** Graph Theory	T	6	3	25	75	100	3	SD	G

24MAP24	**DSC- 20:** Project Work and Viva Voce	-	6	-	100	100	200	8	EN	G
DTC III – Paper Publications / Book Publications										
Total			30				600	22		
Total							2250	90		

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 IV

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	550	22
II	550	23
III	550	23
IV	600	22
Total	**2250**	**90**

*****

List of Courses Offered to other Departments

SEM	Course Code	Course Title	Department	T/P	Ins. Hrs/week	Examination				Credits	SD/EM/EN	L/R/N/G
						Dur. Hrs	CIA	ES	Total Marks			
I	24GEP01	Discrete Mathematical Structures	M.Sc. (IT/CS)	T	5	3	25	75	100	4	SD	G
II	24GEP02	Research Methodology for Bioscience	M.Sc. (BI/BT)	T	4	3	25	75	100	3	SD	G
III/II /II/II	24GEP03	Quantitative Aptitude	M.A. (PA)/ M.Sc. (BI)/ M.Sc. (BT)/ M.A. (EL)	T	4	3	25	75	100	3	EM	G
II	24GEP04	Quantitative Techniques	M.Com./ M.Com (IB)	T	5	3	25	75	100	4	SD	G
II	24GEP05	Statistical Analysis for Social Work	MSW	T	3	3	10	40	50	2	SD	G
II	24GEP06	Practical - Statistical Software Analysis	MSW	P	2	3	20	30	50	2	EM	G
III	24GEP07	Statistical Methods	M.A. (PA)	T	3	3	10	40	50	2	SD	G
II/III /III/IV	24GEP08	Practical- Predictive Software Analysis	M.A.(PA) / M.Com./ M.Com (IB)	P	2	3	20	30	50	2	EM	G
I	24SSI03	Algebra for Software Systems	M.Sc SS	T	4	3	25	75	100	3	SD	G
II	24SSI08	Calculus and Laplace Transforms	M.Sc SS	T	4	3	25	75	100	3	SD	G

List of Courses Offered by Computer Science Department

SEM	Course Code	Course Title	T/P	Ins. Hrs/ week	Examination				Credits	SD/ EM/ EN	L/R/ N/G
					Dur. Hrs	CIA	ES	Total Marks			
I	24GEP23	RDBMS using Oracle	T	4	3	10	40	50	2	EM	G
I	24GEP24	RDBMS using Oracle Lab	P	2	3	20	30	50	2	EM	G
II	24GEP25	Data Mining and Data warehousing	T	4	3	25	75	100	4	EM	G
III	24MAP18	Big Data Analytics	T	3	3	10	40	50	2	SD	G
III	24MAP19	Practical - Data Visualization Lab	P	2	3	20	30	50	2	SD	G