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 Semester)

for 2022-23 admitted students

DEPARTMENT OF MATHEMATICS

SRI KRISHNA ARTS AND SCIENCE COLLEGE
COIMBATORE – 641008

DEPARTMENT OF MATHEMATICS

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	Describe the theoretical concepts and conventions through wider knowledge related to the current trends.(Cognitive)
PLO 2	Develop skills in logical thinking and resolving complex problems through critical thinking skills.(Cognitive)
PLO 3	Establish technical and operational skills in solving the multidisciplinary tasks related to current areas of research in the field.(Psychomotor)
PLO 4	Form as a team in generating competitive decisions through projects in the field of Mathematics and strive for excellence.(Affective)
PLO 5	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	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	Apply quantitative, numerical and statistical skills through the visual and graphical aids for related problems in order to develop research biased knowledge. (Cognitive)
PLO 8	Progressively adopt effective leadership skills to work efficiently in a competitive domestic and global environment. (Affective)

PLO 9	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	Enhance entrepreneurial skills and professional development through consultancy and extension services at a competitive level.(Affective)
PLO 11	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 & 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		

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.

V. 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.

VI. 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	II & III
Generic Electives Courses (GEC)	2	2-4	8	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
Total			**90**	**2250**	

1. 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	22MAP01	**DSC 1**: Algebra	I	6	4	100
2	22MAP02	**DSC 2**: Real Analysis	I	6	4	100
3	22MAP03	**DSC 3:** Ordinary Differential Equations	I	6	4	100
4	22MAP04	**DSC 4**: Graph Theory	I	5	4	100
5	22MAP05	**DSC 5**: Statistical Data Analysis	I	5	4	100
6	22MAP06	**DSC 6: Practical –** Statistical Data Analysis using R	I	2	2	50
7	22MAP07	**DSC 7**: Advanced Linear Algebra	II	6	4	100
8	22MAP08	**DSC 8**: Partial Differential Equations	II	6	4	100
9	22MAP09	**DSC 9**: Fluid Dynamics	II	5	4	100
10	22MAP10	**DSC 10: Self – Study** Excel Macros	II	2	2	50
11	22MAP13	**DSC 11**: Complex Analysis	III	4	4	100
12	22MAP14	**DSC 12**: Topology	III	5	4	100
13	22MAP15	**DSC 13**: Functional Analysis	III	5	4	100
14	22MAP16	**DSC 14** Stochastic Process and Queuing Models	III	4	4	100
15	22MAP17	**DSC 15: Knowledge Management Course**	III	2	2	50
16	22MAP20	**DSC 16**: Mathematical Methods	IV	4	3	100
17	22MAP21	**DSC 17**: Advanced Operations Research	IV	4	3	100
18	22MAP22	**DSC 18**: Big Data Analytics	IV	3	2	50
19	22MAP23	**DSC 19**: Data Analytics Lab	IV	2	2	50
20	22MAP24	**DSC 20: Project Work and Viva voce**	IV	-	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	22MAP11	Numerical Analysis	II	5	5	100
	22MAP12	Inferential Statistics				
2	22MAP18	Practical- Numerical Analysis	III	5	5	100
	22MAP19	Practical – Statistical Tests using Statistical Software				
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	22GEP09	**GEC-I:** RDBMS using Oracle	II	4	2	50
	22GEP10	**GET-1:**Practical- RDBMS using Oracle Lab	II	2	2	50
II	22GEP11	**GEC-II:** Data Mining and Data warehousing	III	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	22MAP22	**DSC 18**: Big Data Analytics	IV	3	2	50
	22MAP23	**DSC 19**: Data Analytics Lab	IV	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.

Knowledge Management Course

22MAP17 Knowledge Management Course – 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

VII.   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			
22MAP01	**DSC-1** Algebra	T	6	3	50	50	100	4	SD	N
22MAP02	**DSC-2** Real Analysis	T	6	3	50	50	100	4	SD	N
22MAP03	**DSC-3** Ordinary Differential Equations	T	6	3	50	50	100	4	EM	R
22MAP04	**DSC-4** Graph Theory	T	5	3	50	50	100	4	SD	R
22MAP05	**DSC-5** Statistical Data Analysis	T	5	3	50	50	100	4	EN	G
22MAP06	**DSC-6** Statistical Data Analysis using R	P	2	3	25	25	50	2	EM	G

DTC I - Additional Credit Courses (NPTEL/ Coursera)

Total			30				550	22		

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			
22MAP07	**DSC-7** Advanced Linear Algebra	T	6	3	50	50	100	4	EM	L
22MAP08	**DSC-8** Partial Differential Equations	T	6	3	50	50	100	4	EM	R
22MAP09	**DSC-9** Fluid Dynamics	T	5	3	50	50	100	4	EN	L
22MAP10	**DSC-10 Self – Study** Excel Macros	P	2	3	-	50	50	2	EM	N
22MAP11/ 22MAP12	**DSE-1** Numerical Analysis/ Inferential Statistics	T	5	3	50	50	100	5	EM	G
22GEP09	**GEC-1** RDBMS using Oracle	T	4	3	25	25	50	2	SD	G

| 22GEP10 | GEC –I Practical: RDBMS using Oracle Lab | P | 2 | 3 | 25 | 25 | 50 | 2 | EM | 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			
22MAP13	**DSC-11** Complex Analysis	T	4	3	50	50	100	4	SD	N
22MAP14	**DSC-12** Topology	T	5	3	50	50	100	4	SD	N
22MAP15	**DSC-13** Functional Analysis	T	5	3	50	50	100	4	SD	N
22MAP16	**DSC-14** Stochastic Process and Queuing Models	T	5	3	50	50	100	4	EM	R
22MAP17	**DSC-15 Knowledge Management Course**	T	2	-	50	-	50	2	EN	G
22MAP18 /22MAP19	**DSE-2** Practical- Numerical Analysis / Practical – Statistical Tests using Statistical Software	P	5	3	50	50	100	5	EN	G
22GEP11	**GEC-2** Data Mining and Data warehousing	T	4	3	50	50	100	4	EN	G
Total			**30**				**650**	**27**		

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			
22MAP20	**DSC-16** Mathematical Methods	T	4	3	50	50	100	3	SD	R
22MAP21	**DSC-17** Advanced Operations Research	T	4	3	50	50	100	3	SD	N
22MAP22	**DSC-16** Big Data Analytics	T	3	3	25	25	50	2	EN	G

22MAP23	DSC-16 Data Analytics Lab	P	2	3	25	25	50	2		EN	G
22MAP24	DSC- XX: Project Work and Viva Voce	-	-	-	100	100	200	8		EN	G
DTC III – Paper Publications / Book Publications											
Total			**30**				**500**	**18**			
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 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	550	22
II	550	23
III	650	27
IV	550	18
Total	**2250**	**90**

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List of Courses Offered to other department

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	22GEP01	Discrete Mathematical Structures	M.Sc. (CT/IT/ CS)	T	5	3	50	50	100	4	SD	G
II	22GEP02	Biological Statistics and Research Methodology	M.Sc. (BI/BT)	T	4	3	50	50	100	4	SD	G
II	22GEP03	Quantitative Techniques	M.Com./ MIB	T	5	3	50	50	100	4	SD	G
II/III	22GEP04	Statistical Methods	MSW/ MA(PA)	T	3	3	25	25	50	2	SD	G
III/II /II/II	22GEP05	Quantitative Aptitude	M.A. (English/ PA)	T	4	3	50	50	100	4	EM	G
II/III /III/I V	22GEP06	Practical- Predictive Software Analysis	MSW/ MA(PA)	P	2	3	25	25	50	2	EM	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			
II	22GEP09	RDBMS using Oracle	T	4	3	25	25	50	2	EM	G
II	22GEP10	**Practical -** RDBMS using Oracle Lab	P	2	3	25	25	50	2	EM	G
III	22GEP11	Data Mining and Data warehousing	T	4	3	50	50	100	4	EM	G
IV	20MAP22	Big Data Analytics	T	4	3	25	25	50	2	SD	G
IV	20MAP23	Data Analytics Lab	P	2	3	25	25	50	2	SD	G