FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)

74th Rank in India Ranking 2020 (NIRF) by MHRD

Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT: MATHEMATICS

NAME OF THE PROGRAMME : M.Sc. MATHEMATICS

PROGRAMME CODE : PSMA

ACADEMIC YEAR : 2021 - 2022

VISION OF THE DEPARTMENT

To empower students both as individuals and as citizens in the society through Mathematics with sound knowledge and investigate new methodologies for future applications.

MISSION OF THE DEPARTMENT

- To achieve high standards of excellence in generating and propagating knowledge in Mathematics
- To lay a solid foundation for the concept of numeracy and scientific thinking
- To give the students, opportunities for developing, manipulative skills that will enable them function effectively in the society within the limits of their capacity
- To contribute to the development of students as Mathematical thinkers and to continue to grow in their chosen professions
- To enable the students to become lifelong learners and to function as productive citizens

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1	Our graduates will be academic, digital and information literates; creative, inquisitive, innovative and committed researchers who would be desirous for the "more" in all aspects
PEO 2	They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work
PEO 3	The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating apt leadership skills
PEO 4	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

GRADUATE ATTRIBUTES (GA)

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

I. SOCIAL COMPETENCE	
GA 1	Deep disciplinary expertise with a wide range of academic and digital literacy

GA 2	Hone creativity, passion for innovation and aspire excellence
GA 3	Enthusiasm towards emancipation and empowerment of humanity
GA 4	Potentials of being independent
GA 5	Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research
GA 6	Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms
GA 7	Communicative competence with civic, professional and cyber dignity and decorum
GA 8	Integrity respecting the diversity and pluralism in societies, cultures and religions
GA 9	All – inclusive skill - sets to interpret, analyse and solve social and environmental issues in diverse environments
GA 10	Self-awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building their strengths and improving on their weaknesses
GA 11	Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals
GA 12	Dexterity in self-management to control their selves in attaining the kind of life that they dream for
GA 13	Resilience to rise up instantly from their intimidating setbacks
GA 14	Virtuosity to use their personal and intellectual autonomy in being life-long learners
GA 15	Digital learning and research attributes

GA 16	Cyber security competence reflecting compassion, care and concern towards the marginalised
GA 17	Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario
II. PROFESSIONAL COMPETENCE	
GA 18	Optimism, flexibility and diligence that would make them professionally competent
GA 19	Prowess to be successful entrepreneursand employees of trans-national societies
GA 20	Excellence in Local and Global Job Markets
GA 21	Effectiveness in Time Management
GA 22	Efficiency in taking up Initiatives
GA 23	Eagerness to deliver excellent service
GA 24	Managerial Skills to Identify, Commend and tap Potentials
III. ETHICAL COMPETENCE	
GA 25	Integrity and discipline in bringing stability leading a systematic life promoting good human behaviour to build better society
GA 26	Honesty in words and deeds
GA 27	Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life
GA 28	Social and Environmental Stewardship
GA 29	Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience
GA 30	Right life skills at the right moment

PROGRAMME OUTCOMES (PO)

The learners will be able to

PO 1	Apply acquired scientific knowledge to solve major and complex issues in the society/industry.
PO 2	Attain research skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to solve complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES (PSO)

On completion of M.Sc. Mathematics programme, the graduates would be able to

PSO 1	Develop proficiency in the analysis of complex mathematical problems and the use of Mathematical or other appropriate techniques to solve them.

PSO 2	Provide a systematic understanding of core mathematical concepts, principles and theories along with their applications.
PSO 3	Demonstrate the ability to conduct Research independently and pursue higher studies towards the Ph. D degree in Mathematics and computing
PSO 4	Understand the fundamental axioms in Mathematics and Mathematical ideas based on them.
PSO 5	Provide advanced knowledge on topics in Pure Mathematics, empowering the students to pursue higher studies.

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF MATHEMATICS

For those who joined in June 2019 onwards

MAJOR CORE – 70 CREDITS

PROGRAMME CODE : PSMA

S. No	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19PG1M1	Algebra	6	4	40	60	100
2.		19PG1M2	Real Analysis	6	4	40	60	100
3.		19PG1M3	Number Theory	6	4	40	60	100
4.		19PG1M4	Classical Mechanics	6	4	40	60	100
5.	II	19PG2M5	Advanced Algebra	6	4	40	60	100
6.		19PG2M6	Advanced Real Analysis	6	4	40	60	100
7.		19PG2M7	Differential Equations	6	4	40	60	100
8.		19PG2M8	Graph Theory	6	4	40	60	100
9.	III	19PG3M9	Measure and Integration	6	4	40	60	100
10.		19PG3M10	Optimization Techniques	6	4	40	60	100
11.		19PG3M11	Combinatorics	6	4	40	60	100
12.		19PG3M12	Topology	6	6	40	60	100
13.	IV	19PG4M13	Complex Analysis	6	5	40	60	100
14.		19PG4M14	Statistics	6	5	40	60	100
15.		19PG4M15	Methods of Applied Mathematics	6	5	40	60	100
16.		19PG4M16	Functional Analysis	6	5	40	60	100

MAJOR ELECTIVE / EXTRA DEPARTMENTAL COURSE / INTERNSHIP/ PROJECT -20 CREDITS

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
1.	I	19M1EDC	Optimization Methods	3	3	40	60	100
2.	II	19M2EDC	Optimization Methods	3	3	40	60	100
3.	III	21PG3ME1/ 19PG3ME2	Fuzzy sets and Applications / Numerical Analysis	4	4	40	60	100
4.		19PG3SIL1	Summer Internship	-	3	40	60	100
5.	IV	19PG4ME3/ 19PG4ME4	Formal Languages/ Algebraic Graph Theory	4	4	40	60	100
6.		19PG4L17	Project	-	3	40	60	100
			TOTAL	**14**	**20**			

OFF-CLASS PROGRAMMES

ADD-ON COURSES

COURSE CODE	COURSES	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA MKS	ESE MKS	TOTAL MARKS
19PADSS	**SOFT SKILLS**	40	3	I	40	60	100
19PADCA	**COMPUTER APPLICATIONS** LATEX	40	4	II	40	60	100
19PADCV	**COMPREHENSIVE VIVA** (Question bank to be prepared for all the courses by the respective course teachers)	-	2	IV	-	-	100
19PADRC	**READING CULTURE**	10	1	I-IV	-	-	-
	TOTAL		**10**				

EXTRA CREDIT COURSES

COURSE CODE	COURSES	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA MKS	ESE MKS	TOTAL MARKS
19PGSLM1	**PROBLEMS IN ADVANCED MATHEMATICS FOR II PG)**	-	2	IV	40	60	100
21PGSLLM1	**Verbal and Numerical Aptitude for National Examinations (For I PG)**	-	2	II	40	60	100
	MOOC COURSES / International Certified online Courses(Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM /UGC /CEC	-	Minimum 2 Credits	I – IV	-	-	

- **Summer Internship:**
  - Duration-1 month (2nd Week of May to 2nd week of June-before college reopens)
- **Project:**
  - Off class
  - Evaluation components-Report writing + Viva Voce (Internal marks-40) + External marks 60
- **EDC:**

- Syllabus should be offered for two different batches of students from other than the parent department in Sem-I & Sem-II

OLD

II M.Sc. Mathematics

10% Removed

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	19PG3ME1	FUZZY SETS AND APPLICATIONS	PG Core	4	4

COURSE DESCRIPTION

This course is focused on the fundamental theory of fuzzy sets, fuzzy logic which can be applied in data mining and decision making in various fields.

COURSE OBJECTIVES

To enable the students to understand the basic concepts of Crisp sets, Fuzzy sets, operations on fuzzy set, Fuzzy relations and applications of Fuzzy sets.

UNITS

UNIT –I CRISP SETS AND FUZZY SETS (12 HRS.)

7% Removed

Crisp sets : An over view, the notion of Fuzzy sets, Basic concepts of Fuzzy sets, Classical Logic: an over view, Fuzzy logic.

UNIT –II OPERATIONS ON FUZZY SETS (12 HRS.)

General discussion, Fuzzy Complements, Fuzzy Union, Fuzzy Intersection, Combinations of operations.

UNIT –III FUZZY RELATIONS (12 HRS.)

Crisp and Fuzzy Relations, Binary Relations on a single set, **Equivalence and similarity Relations (self study)**..

UNIT –IV FUZZY MEASURES (12 HRS.) 3 % Removed

General Discussion, Belief and Plausibility Measures, Possibility and Necessity Measures.

UNIT –V APPLICATIONS (12 HRS.)

General Discussion, natural, Life and Social Sciences, **Engineering**, **Medicine and Management and Decision making (self study)**.

TEXT BOOK:

1.George J. Klir And Tina A. Folger, *Fuzzy Sets*, Uncertainty and Information-Prentice Hall of India Private Limited, New Delhi – 1, 2009.

REFERENCES:

1. George J. Llir and Boyuan, *Fuzzy Sets and Fuzzy logic, Theory and applications*- Prentice Hall of India, 2002.

2. Zimmermann, *Fuzzy Set Theory and its applications*, Affiliated East West Press Pvt , Ltd, Second Edition 1996.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**CRISP SETS AND FUZZY SETS**			
1.1	Crisp sets : An over view	3	Chalk & Talk	Black Board
1.2	the notion of Fuzzy sets	3	Chalk & Talk	Black Board
1.3	Basic concepts of Fuzzy sets	2	Chalk & Talk	Black Board
1.4	Classical Logic: an over view	2	Chalk & Talk	Black Board
1.5	Fuzzy logic.	2	Chalk & Talk	Black Board
UNIT -2	**OPERATIONS ON FUZZY SETS**			
2.1	General discussion	3	Chalk & Talk	Black Board
2.2	Fuzzy Complements	3	Chalk & Talk	Black Board
2.3	Fuzzy Union, Fuzzy Intersection	3	Chalk & Talk	Black Board
2.4	Combinations of operations	3	Chalk & Talk	Black Board
UNIT -3	**FUZZY RELATIONS**			
3.1	Crisp and Fuzzy Relations	4	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
3.2	Binary Relations on a single set	4	Chalk & Talk	Green Board
3.3	Equivalence and similarity Relations.	4	Chalk & Talk, Discussion	Black Board
UNIT -4 FUZZY MEASURES				
4.1	General Discussion	4	Discussion	Black Board
4.2	Belief and Plausibility Measures	4	Discussion	Black Board
4.3	Possibility and Necessity Measures.	4	Discussion	Black Board
UNIT -5 APPLICATIONS				
5.1	General Discussion, natural , Life and Social Sciences	4	Discussion	Black Board
5.2	Engineering	4	Discussion	Black Board
5.3	Medicine and Management and Decision making .	4	Discussion	Black Board

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Better of W1, W2 5	M1+M2 5+5=10	Mid-Sem.Test 15	Once in a Sem. 5	35	5	40	
K1	-	-	-	-	-		-	-
K2	-	2	3	-	5		5	12.5 %
K3	5	3	4	-	12		12	30 %
K4	-	5	4	-	9		9	22.5%
K5	-	-	4	5	9		9	22.5 %
Non-Scho.						5	5	12.5 %
Total	5	10	15	5	35	5	40 mks.	100 %

CIA	
Scholastic	35
Non Scholast	5
	40

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I PG are :**

K2*-Understand,* ***K3****-Apply,* ***K4****-Analyse, K5 – Evaluate*

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Better of Two Weekly Tests

C2 – Total of Two Monthly Tests

C3 - Mid Sem Test

C4 – Once in a semester (Seminar / Assignment/Project)

C5 – Non - Scholastic

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Distinguish crisp sets and Fuzzy sets	K2	PSO1
CO 2	Classify operators on Fuzzy sets	K2, K3,	PSO1 & PSO2
CO 3	Describe Fuzzy relations	K2 & K4	PSO2 & PSO4
CO 4	Describe Fuzzy Measures	K2, K3 & K4	PSO3 & PSO4
CO 5	Apply Fuzzy sets in real life situations	K3 & K5	PSO3 & PSO5

COURSE DESIGNER:

1. **Ms. A. Sahaya Roseline Divya**
2. **Dr. Mrs. V. Vanitha**

Forwarded By

(A.Paulin Mary)

HOD's

Signature & Name

NEW

10% Removed

II M.Sc. Mathematics

SEMESTER –III

For those who joined in 2021 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
PSMA	21PG3ME1	FUZZY SETS AND APPLICATIONS	Core	4	4

COURSE DESCRIPTION

This course is focused on the fundamental theory of fuzzy sets, fuzzy logic which can be applied in data mining and decision making in various fields.

COURSE OBJECTIVES

To enable the students to understand the basic concepts of Crisp sets, Fuzzy sets, operations on fuzzy set, Fuzzy relations and applications of Fuzzy sets.

UNITS

UNIT –I CRISP SETS AND FUZZY SETS (12 HRS.)

Crisp sets : An over view, the notion of Fuzzy sets, Basic concepts of Fuzzy sets.

UNIT –II OPERATIONS ON FUZZY SETS (12 HRS.)

General discussion, Fuzzy Complements, Fuzzy Union, Fuzzy Intersection, Combinations of operations.

UNIT –III FUZZY RELATIONS (12 HRS.)

Crisp and Fuzzy Relations, Binary Relations on a single set, **Equivalence and similarity Relations (self study)**..

UNIT –IV FUZZY MEASURES (12 HRS.)

General Discussion, Belief and Plausibility Measures, Probability Measures.

UNIT –V APPLICATIONS **(12 HRS.)**

General Discussion, natural, Life and Social Sciences, **Engineering**, **Medicine and Management and Decision making (self study)**.

TEXT BOOK:

1.George J. Klir And Tina A. Folger, *Fuzzy Sets*, Uncertainty and Information-Prentice Hall of India Private Limited, New Delhi – 1, 2009.

REFERENCES:

1. George J. Llir and Boyuan, *Fuzzy Sets and Fuzzy logic, Theory and applications*- Prentice Hall of India, 2002.
2. Zimmermann, *Fuzzy Set Theory and its applications*, Affiliated East West Press Pvt , Ltd, Second Edition 1996.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**CRISP SETS AND FUZZY SETS**			
1.1	Crisp sets : An over view	3	Chalk & Talk	Black Board
1.2	the notion of Fuzzy sets	3	Chalk & Talk	Black Board
1.3	Basic concepts of Fuzzy sets	2	Chalk & Talk	Black Board
UNIT -2	**OPERATIONS ON FUZZY SETS**			
2.1	General discussion	3	Chalk & Talk	Black Board
2.2	Fuzzy Complements	3	Chalk & Talk	Black Board
2.3	Fuzzy Union, Fuzzy Intersection	3	Chalk & Talk	Black Board

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
2.4	Combinations of operations	3	Chalk & Talk	Black Board
UNIT -3 FUZZY RELATIONS				
3.1	Crisp and Fuzzy Relations	4	Chalk & Talk	Black Board
3.2	Binary Relations on a single set	4	Chalk & Talk	Green Board
3.3	Equivalence and similarity Relations.	4	Chalk & Talk, Discussion	Black Board
UNIT -4 FUZZY MEASURES				
4.1	General Discussion	4	Discussion	Black Board
4.2	Belief and Plausibility Measures	4	Discussion	Black Board
4.3	Possibility	4	Discussion	Black Board
UNIT -5 APPLICATIONS				
5.1	General Discussion, natural , Life and Social Sciences	4	Discussion	Black Board
5.2	Engineering	4	Discussion	Black Board
5.3	Medicine and Management and Decision making .	4	Discussion	Black Board

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Seminar 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K2	4	4	-	-	-	8	-	8	20 %
K3	2	2	-	5	-	9	-	9	22.5 %
K4	2	2	-	-	5	9	-	9	22.5 %
K5	2	2	5	-	-	9	-	9	22.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

INTERNAL - PG

CIA

Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

- **PG CIA Components**

			Nos		
C1	-	Test (CIA 1)	1	-	10 Mks
C2	-	Test (CIA 2)	1	-	10 Mks
C3	-	Assignment	2 *	-	5 Mks
C4	-	Open Book Test/PPT	2 *	-	5 Mks
C5	-	Seminar	1	-	5 Mks
C6	-	Attendance		-	5 Mks

****The best out of two will be taken into account***

COURSE OUTCOMES

On the successful completion of the course, students will be able to:

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Distinguish crisp sets and Fuzzy sets	K2	PSO1
CO 2	Classify operators on Fuzzy sets	K2, K3,	PSO1 & PSO2
CO 3	Describe Fuzzy relations	K2 & K4	PSO2 & PSO4

CO 4	Describe Fuzzy Measures	K2, K3 & K4	PSO3 & PSO4
CO 5	Apply Fuzzy sets in real life situations	K3 & K5	PSO3 & PSO5

Mapping COs Consistency with PSOs

CO/ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	2
CO2	3	3	2	2	2
CO3	2	3	2	3	2
CO4	2	2	3	3	2
CO5	2	3	2	2	3

Mapping of C0s with POs

CO/ PO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	3	2	2
CO3	2	2	2	3
CO4	3	2	2	2
CO5	2	2	3	2

Note: ♦ Strongly Correlated – **3** ♦ Moderately Correlated – **2**

♦ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr. Mrs. V. Vanitha

Forwarded By

(A.Paulin Mary)

HOD's

Signature & Name