

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
CUDDALORE-1**



PG & RESEARCH DEPARTMENT OF MATHEMATICS

M.Phil. MATHEMATICS

SYLLABUS (2021-2022)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

CURRICULUM TEMPLATE

M.Phil. MATHEMATICS

SEMESTER – I

S.No	Part		Hours/ Week	Credit	Course Code	Course Title	Maximum Marks		
							CIA	ESE	TOTAL
1	III	Core Theory - 1	6	5	MMT101A	Algebra and Analysis	25	75	100
2	III	Core Theory - 2	6	5	MMT102A	Topology and Differential Equations	25	75	100
3	III	Core Theory - 3	6	5	GMT201	Elective Paper (Guide Paper)	25	75	100
4	III	Library	-	2		Research and Publication Ethics	-	-	-
Semester Total			30	17			75	225	300

SEMESTER – II

S.No	Part		Hours/ Week	Credit	Course Code	Course Title	Maximum Marks		
							CIA	ESE	TOTAL
5	III	Core Theory - 1		19	JMT201	Dissertation and Viva Voice	100	100	200
Semester Total				19			100	100	200

Syllabus - Mathematics

YEAR – I	ALGEBRA AND ANALYSIS FOR THE STUDENT ADMITTED FROM 2016	MMT101A
SEMESTER –I		Hrs / Week: 6
CORE – I		Credit: 5

OBJECTIVES:

The course aims to apply the concepts of Rings, Ideals, Modules of Fractions and Primary Decomposition, Abstract Integration, L^p – spaces, Fourier Transforms and Holomorphic Fourier Transforms in Research Paper.

COURSE OUTCOME:

- CO1: Knowing the advance concepts of rings, ideals and modules.
- CO2: Getting the knowledge of rings modules of Fractions and primary decomposition.
- CO3: Knowing the advanced concepts of measure theory and HP spaces.
- CO4: Knowing the Fourier transforms and some new types.
- CO5: Getting the basic knowledge of research methodology

SEMESTER IV	COURSE CODE: MMT101A	COURSE TITLE: ALGEBRA AND ANALYSIS	HOURS: 6	CREDIT: 5												
COURSE OUTCOME	PROGRAMME OUTCOME (PO)					PROGRAMME SPECIFIC OUTCOME(PSO)										Mean Score of CO's
	P O 1	P O 2	P O 3	P O 4	P O 5	P S O 1	P S O 2	P S O 2	P S O 4	P S O 5	P S O 6	P S O 7	P S O 8	P S O 9	PSO 10	
CO1	4	5	4	3	2	4	3	4	3	4	3	4	4	5	4	3.6
CO2	5	5	5	4	2	3	4	5	4	3	4	3	3	5	4	3.6
CO3	3	4	4	3	2	5	4	3	5	4	4	4	5	3	3	4.0
CO4	4	5	3	4	2	5	4	4	5	4	3	5	4	4	5	3.9
CO5	3	5	5	3	2	4	4	3	5	4	4	5	3	5	5	3.6
Mean Overall Score															3.7	

Result: The Score of this Course is 3.7 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	$0 \leq \text{rating} \leq 1$	$1.1 \leq \text{rating} \leq 2$	$2.1 \leq \text{rating} \leq 3$	$3.1 \leq \text{rating} \leq 4$	$4.1 \leq \text{rating} \leq 5$
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT I: RINGS, IDEALS AND MODULES

Rings and ring homomorphism-Ideals, Quotient rings-Zero-divisors, Nil potent elements, units-Prime ideals and maximum ideals-Nil radical and Jacobson radical-operations on ideals-extension and contraction-exercises-Modules and module homomorphism-sub modules and quotient modules-operation on sub modules-Direct sum and product-Finitely generated modules. -Exercises.

UNIT-II: RINGS, MODULES OF FRACTIONS AND PRIMARY DECOMPOSITION

Extract sequences-Tensor product of modules-Restriction and extension of scalars-Exactness properties of the tensor product-Algebra-Tensor product of algebras-Local properties-Extended and contracted ideals in rings of fractions Exercises- Primary decomposition – Exercise.

UNIT-III: ABSTRACT INTEGRATION AND L^p – SPACES

L^p - Spaces

Convex Function and Inequalities – The L^p - Spaces – Approximation by Continuous Functions – The Inversion Theorem.

H^p Spaces

The concept of H^p spaces-the role played by the H^p spaces-simple functions –inequalities-Exercises.

UNIT-IV:FOURIER TRANSFORMS AND HOLOMORPHIC FOURIER TRANSFORMS

Formal properties – The Invention Theorem – thePlancheral Theorem – The Banach algebra Li- Introduction – Two Theorems of Paley and Wiener – Quasi – analytic classes – The Denjoy- Carleman theorem.

UNIT-V: RESEARCH METHODOLOGY

Research – Research methods and methodology –Types of Research – Mode of approach– Art of writing a Research paper and thesis

TEXT BOOKS:

1. M.F. Atiyah, I.G. Macdonald, Introduction to Commutative Algebra, Addison – Wesley Publishing Company, 1969.
Unit-I Chapter – 1 (pg 1-10), Chapter – 2 (pg 17 – 31)
Unit-II Chapter - 3 (pg 36 – 43), Chapter – 4 (pg 50 – 55)
2. Walter Rudin, Real and Complex Analysis II Edition, McGraw Hill International, 1986.
Unit – III Chapter - 3 (pg61 – 70), Chapter – 17 (pg335 – 355),
Unit-IV Chapter – 9 (pg 178 – 193), Chapter – 19(pg 371 – 383) .
3. Unit-V Research Methodologyby S Rajasekar, P Philominathan and V Chinnathambi, e-material at <http://arxiv.org/pdf/physics/0601009.pdf>

YEAR – I	TOPOLOGY AND DIFFERENTIAL EQUATIONS	MMT102A
SEMESTER –I		Hrs / Week: 6
CORE-2		Credit: 5
FOR THE STUDENT ADMITTED FROM 2016		

OBJECTIVES:

The course aims to apply the concepts Fundamental Group, Covering Spaces, Simplified Complexes, Linear Systems, and Non Linear Systems: Local Theory, Techniques and Dynamics of Teaching- Learning in Research Paper.

COURSE OUTCOME:

CO1: Get Knowing the fundamental group and covering spaces

CO2: Knowing the simplicial complexes.

CO3: Knowing the linear systems

CO4: getting the knowledge of nonlinear systems: local theory

CO5: Knowing the techniques and dynamic of teaching.

SEMESTER IV	COURSE CODE: MMT102A	COURSE TITLE : TOPOLOGY AND DIFFERENTIAL EQUATIONS														HOURS: 6	CREDIT: 5
COURSE OUTCOME	PROGRAMME OUTCOME (PO)					PROGRAMME SPECIFIC OUTCOME(PSO)										Mean Score of CO's	
	P O 1	P O 2	P O 3	P O 4	P O 5	P S O 1	P S O 2	P S O 2	P S O 4	P S O 5	P S O 6	P S O 7	P S O 8	P S O 9	PSO 10		
CO1	4	5	4	3	2	4	3	4	3	4	3	4	4	5	4	3.6	
CO2	5	5	5	4	2	3	4	5	4	3	4	3	3	5	4	3.5	
CO3	3	4	4	3	2	5	4	3	5	4	4	4	5	3	3	4.0	
CO4	4	5	3	4	2	5	4	4	5	4	3	5	4	4	5	3.9	
CO5	3	5	5	3	2	4	4	3	5	4	4	5	3	5	5	3.6	
Mean Overall Score																3.67	

Result: The Score of this Course is 3.67 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT –I: FUNDAMENTAL GROUP AND COVERING SPACES

Homotopy – Fundamental group – Covering spaces.

UNIT – II: SIMPLICIAL COMPLEXES

Geometry of Simplicial Complexes - Bary Centric subdivisions – Simplicial approximation Theorem – Fundamental Group of a simplicial Complex.

UNIT-III: LINEAR SYSTEMS

Uncoupled Linear System – Diagonalization – Exponentials operators – The Fundamental Theorem for linear system – Linear System in R^2 – Complex Eigen Values – Multiple Eigen Values – Non Homogeneous Linear System.

UNIT-IV: NON LINEAR SYSTEMS: LOCAL THEORY

Some preliminary concepts & definitions – The Fundamental Existence – Uniqueness Theorem – Dependence on Initial Conditions and Parameters – The Maximum Interval of Existence- The Flow Defined by a Differential Equation.

UNIT-V: TECHNIQUES AND DYNAMICS OF TEACHING- LEARNING

- a. Emerging trends in Educational Psychology– Meaning, Scope and Methods
- b. Learning–Different Theories of learning, Approaches to learning(Classical Conditioning- Ivan Pavlov; Operant conditioning-B.F.Skinner); kinds of learning, factors affecting learning
- c. Motivation: Intrinsic and extrinsic motivation, Development of memory and intelligence.

TEXT BOOKS:

1. I.M.Singer, J.A.Thorpe, Lecture notes on Elementary Topology and Geometry, Springer- Verlag, Newyork,1967.
Unit-I -Chapter -3 ,pg(49-77)Unit-II-Chapter -4 ,pg (78-108)
2. L.Pergo,Differential Equation and Dynamical System, thirdedition, Springer –Verlag, Newyork,2006
Unit-III Chapter -1,sections (1.1 to 1.7and 1.10) –pg(1-39 , 60-63)
Unit-IV Chapter -2,sections (2.1 to 2.5)-pg(65-101)
3. Unit-V : Covey, Stephen. (2004),7 Habits of Highly effective people, Free Press.
Driscoll, M. P. (2005),Psychology of Learning for Instruction, Pearson HigherEd.
Gardner, Howard (1983; 1993) Frames of Mind: The theory of multiple intelligences, New York: Basic Books

QUESTION PATTERN

Internal Examination (25 marks)

Two Internal Examinations	15 marks
Assignment / Seminar	10 marks
Total	25 marks

External Examination (75 marks)

Question Pattern

M. Phil. COMPUTER SCIENCE

Time: 3 Hours

Max. Marks: 75

PART A (5x6=30)

ANSWER ALL FIVE QUESTIONS

Internal Choice (Either or Pattern)

PART B (3x15=45)

ANSWER ANY THREE QUESTIONS

Out of Six Questions (Open Choice)

TOTAL (30+45=75)