

DEPARTMENT OF MATHEMATICS

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**PERIYAR
MANIAMMAI
UNIVERSITY**



NAAC ACCREDITED

Curriculum & Syllabus M.Phil., Mathematics

REGULATION 2016

M. Phil (MATHEMATICS) – CURRICULUM (Full Time)

REGULATION – 2016(Before Revision)

M.PHIL MATHEMATICS – CURRICULUM (FROM 2016-17 ONWARDS)

Semester	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
I	ZMA101	Research Methodology	4	2	0	6
	ZMA102	Algebra & Analysis	4	2	0	6
	ZMA103	Advanced Graph Theory	4	2	0	6
		Total				18

Semester	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
II	ZMA201	Mathematical Statistics (Guide Paper)	4	0	0	4
	ZSW202	Teaching Learning Skills	1	2	0	2
	ZMA202	Research Project - Dissertation	0	0	0	16
		Total				22

Total Number of Credits :40

Semester I

COURSE CODE			COURSENAME	L	T	P	C
ZMA101			RESEARCH METHODOLOGY	4	4	0	6
C	P	A					
4	0	0		L	T	P	H
				4	4	0	8
PREREQUISITE: Basic Statistics							
COURSE OUTCOMES:							
Course outcomes				Domain		Level	
CO1: Define and Explain data collection and thesis writing.				Cognitive		Remembering Understanding	
CO2: Apply the concept of testing of hypothesis and solve the problems.				Cognitive		Applying	
CO3: Apply the concept of CPM/PERT, Transportation problem, Assignment problem, sequencing problem and solve the problems.				Cognitive		Applying	
CO4: Define and Explain steps of algorithmic research and design of experiments				Cognitive		Remembering Understanding	
CO5: Define and Explain pedagogy and teaching skill and difference between teaching and instruction.				Cognitive		Remembering Understanding	
UNIT I RESEARCH METHODOLOGY							18
Types of Research Process, Data Collection – Primary Data, Secondary data – Thesis writing: Thesis at Tertiary level – Writing, Planning the thesis – the general format, footnotes, tables & figures, reference & appendix.							
UNIT II TEST OF HYPOTHESIS							18
Test of Hypothesis concerning means, propositions, variances, Chi Square Test, Goodness of Fit test. Non-Parametric Tests: One sample tests, Two sample tests, K-sample tests.							
UNIT III OPERATIONS RESEARCH							18
CPM/PERT Analysis, Transportation Problems, Job Sequence Problems, Assignment Problems.							
UNIT IV ALGORITHMIC RESEARCH							18
Algorithmic research problems – Types of solution procedure – steps of Development of Algorithm – Steps of Algorithm Research – Design of Experiments and Comparison of Algorithm Meta Heuristic for Combinatorial problems.							
UNIT VPEDAGOGY AND TEACHING SKILL							18
Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning a Lecture, Delivery of a lecture – Lecture with power point presentation – Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board writing and Skill of Closure – Integration of Teaching Skills.							
LECTURE		TUTORIAL				TOTAL	
60		30				90	

REFERENCES

1. "Thesis & Assignment Writing" By Anderson, Berny H. Dujrston, H. Pode, Wiley Eastern Ltd., New Delhi, 1970.
2. "Operations Research" An Introduction by H.A. Taha Collier Macmillan International Edition, 1982.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "Introduction to algorithms" Prentice Hall 1990.
4. "Research Methodology" R. Panneerselvam, PHI, New Delhi 2005.
5. Mangal, S.K. (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
6. Michael D. and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York.
7. Pandey S.K. (2005) Teaching Communication, Commonwealth Publishers, New Delhi.

COURSECODE			ZMA102			L	T	P	C
COURSE NAME			ALGEBRA& ANALYSIS			4	4	0	6
PREREQUISIT E			BASIC CONCEPTS OF COMMUTATIVE ALGEBRA						
C	P	A				L	T	P	H
4	0	0				4	4	0	8
COURSE OUTCOMES						DOMAIN	LEVEL		
CO1: Define and explain the concept modules.						Cognitive	Remembering Understanding		
CO2: Define and Explain the concepts of Noetherian Rings.						Cognitive	Remembering Understanding		
CO3: Define and Explain the concepts of Topological preliminaries and measurable functions.						Cognitive	Understanding		
CO4: Define and explain Fourier Transforms						Cognitive	Remembering Understanding		
CO5: Define and explain Riemann Mapping Theorem						Cognitive	Remembering Understanding		
UNIT I MODULES									18
Basic definitions– Group of homomorphisms– Direct products and sums of modules – Free modules– Vector spaces– The dual space and dual module.									
UNIT II NOETHERIAN RINGS									18
Basic criteria –Associated primes – Primary decomposition - Nakayama’s lemma.									
UNIT III RIESZ REPRESENTATION THEOREM									18
Topological preliminaries - Riesz representation theorem–Regularity properties of Borel measures –Lebegue measure– continuity properties of measurable functions.									
UNIT IV FOURIER TRANSFORMS									18
Formal properties–Inversion theorem–The Plancherel theorem– Banach Algebra									
UNIT V RIEMANN MAPPING THEOREM									18
Preservation of angles–Linear fractional transformations– Normal families-Riemann Mapping Theorem.									
			LECTURE			TUTORIAL		TOTAL	
			60			30		90	
TEXT BOOKS									
1. Serge Lang,” Algebra”, Springer-Verlag, Revised Third Edition, 2002. Unit –I -Chapter III: Sections 1 to 6 Unit –II – Chapter X: Sections 1 to 4.									
2. W. Rudin,” Real and Complex Analysis”, 3rd.edition, McGraw Hill International,1986. Unit III– Chapter2; Unit IV – Chapter 9; Unit V - Chapter14									

REFERENCES
1. C. Musili, “Rings and Modules”, 2 nd edition, Narosa, 1994.
2. P.B. Bhattacharya et al., “Basic Abstract Algebra”, 2 nd edition, Cambridge University Press, 1995.
3. Serge Lang, “Complex Analysis”, Addison Wesley, 1977.
4. V. Karunakaran, “Complex Analysis”, 2 nd edn, Narosa, New Delhi, 2005.
E REFERENCES
NMEICT repository http://nptel.ac.in/courses

ZMA103			ADVANCED GRAPH THEORY	4	4	0	8
C	P	A					
4	0	0		L	T	P	H
				4	8	0	12
PREREQUISITE:							
COURSE OUTCOMES:							
Course outcomes				Domain	Level		
CO1: Define and Explain connectivity in graphs				Cognitive	Remembering Understanding		
CO2: Apply coloring of graphs and solve problems in Vertex colorings and Edge coloring				Cognitive	Applying		
CO3: Define and Explain planar graphs				Cognitive	Applying		
CO4: Define and Explain Ramsey Theory				Cognitive	Remembering Understanding		
CO5: Find different types of graph labeling for different types of graphs				Cognitive	Remembering Understanding		
UNIT I CONNECTIVITY IN GRAPHS							24
Vertex connectivity – Edge connectivity – Blocks – k-connected and k-edge connected graphs – Network flow problems.							
UNIT II COLORING OF GRAPHS							24
Vertex colorings and upper bounds – Brooks’ theorem – Graphs with large chromatic number – Turan’s theorem – Counting proper colorings – Edge coloring – Characterization of line graphs.							
UNIT III PLANAR GRAPHS							24
Embeddings and Euler’s formula – Dual graphs – Kuratowski’s theorem – 5 colour theorem – Crossing number.							
UNIT IV RAMSEY THEORY							24
The pigeonhole principle – Ramsey’s theorem – Ramsey numbers – Graph Ramsey theory. The characteristic polynomial – Linear algebra of real symmetric matrices – Eigenvalues and graph parameters – Eigenvalues of regular graphs.							
UNIT V GRAPH LABELING							24
Types of labeling – graceful labeling – harmonious labeling – odd graceful, even graceful, magic labeling.							
		LECTURE	TUTORIAL			TOTAL	
		60	60			120	
TEXT BOOK:							
1. Douglas B. West, “Introduction to Graph Theory”, Prentice Hall of India, Second Edition, 2002.							
REFERENCES							
1. Bondy J. A, and Murty U. S. R., “Graph Theory”, Springer, 2008.							
2. Balakrishnan R. and Ranganathan K., “ A textbook of Graph Theory”, Springer, 2012.							
3. Graham R.L., Rothschild B.L and Spencer J.H., “Ramsey Theory”, Wiley Publishers, Second Edition, 1990.							
4. Biggs N., “Algebraic Graph Theory”, Cambridge Tracts in Mathematics 67, Cambridge University Press, 1994. MX8003 Algebraic Theory of Semigroups							
E REFERENCES							
NMEICT repository http://nptel.ac.in/courses							

Semester II

COURSE CODE			COURSE NAME	L	T	P	C
ZMA201			MATHEMATICAL STATISTICS	4	0	0	4
C	P	A					
4	0	0		L	T	P	H
				4	0	0	4
PREREQUISITE: Nil							
COURSE OUTCOMES:							
Course outcomes:				Domain	Level		
CO1: Define and Explain Estimation Theory.				Cognitive	Remembering Understanding		
CO2: Explain and solve Tests based on normal, t and f distributions for testing of means, variance and proportions – Analysis of $r \times c$ tables – Goodness of fit				Cognitive	Understanding Applying		
CO3: Explain and solve Correlation and Regression.				Cognitive	Understanding Applying		
CO4: Explain and solve Design of Experiments				Cognitive	Understanding Applying		
CO5: Explain and solve Statistical Quality Control by X , R charts, p, c and np charts.				Cognitive	Understanding Applying		
UNIT I Estimation Theory							12
Estimators: Un biasedness, Consistency, Efficiency and Sufficiency – Maximum likelihood estimation – Method of moments.							
UNIT II Testing of Hypothesis							12
Tests based on normal, t and f distributions for testing of means, variance and proportions – Analysis of $r \times c$ tables – Goodness of fit.							
UNIT III Correlation and Regression							12
Multiple and Partial correlation – Method of least squares – Plane of Regression – Properties of residuals – Coefficient of multiple correlation – Coefficient of partial correlation - Multiple correlation with total and partial correlation – Regression and Partial correlations in terms of lower order co-efficient.							
UNIT IV Design of Experiments							12
Analysis of variance – One way and two-way classifications – Completely randomized design – Randomized block design – Latin square design.							
UNIT V Statistical Quality Control							12
Analysis of variance: Control charts for measurements (X and R charts) – control charts for attributes (p, c and np charts) – Tolerance limits – Acceptance sampling, Introduction to SPSS.							
	LECTURE						TOTAL
	60						60

TEXTBOOK

1. Gupta. S.C., and Kapoor. V.K., “Fundamentals of Mathematical Statistics”, Sultan Chand and sons, Thirteenth Edition, 2014.

REFERENCES

1. J.E. Freund, “Mathematical Statistical”, 5th Edition, Prentice Hall of India, 2001.
2. Jay L. Devore, “Probability and Statistics for Engineering and the Sciences”, 5th Edition, Thomas and Duxbury, Singapore, 2002.

COURSE CODE			COURSE NAME	L	T	P	C
ZSW202			TEACHING LEARNING SKILLS	1	2	0	2
C	P	A					
2	0	0		L	T	P	H
				1	2	0	3
PREREQUISITE: Nil							
COURSE OUTCOMES:							
Course outcomes				Domain	Level		
CO1: Define and Explain the role of a teacher in different phases of teaching.				Cognitive	Remembering Understanding		
CO2: Define and Explain various micro teaching skills.				Cognitive	Remembering Understanding		
CO3: Define and Explain the Learning and different methods of teaching.				Cognitive	Remembering Understanding		
CO4: Define and Explain the importance of teaching devices and techniques.				Cognitive	Remembering Understanding		
CO5: Apply the concept and solve the problems using SPSS.				Cognitive	Applying		
UNIT I CONCEPT OF TEACHING							6
Teaching- an art or a science? - Relationship between Teaching and Learning. Analysis of the concept of Teaching - Teaching as a deliberately - planned process: Analysis in terms of teaching skills - General Model of instruction – Pre active, Interactive and Post active - phases and Teachers role in them.							
UNIT II SKILLS IN TEACHING							6
Microteaching skills – need, procedure, cycle of operations and uses – set induction, stimulus variation, reinforcement, questioning, illustrating, explaining demonstrating, using black board, link lesson and closure							
UNIT III CONCEPTS OF LEARNING							6
Nature and importance of learning – Individual differences in learning - Learning Curves- Factors influencing the learning- theories of learning - Transfer of Learning- Learning by Imitation.							
UNIT IV TECHNIQUES OF TEACHING-LEARNING – LARGE GROUP							6
Lecturing - Place in Higher Education - Purposes served - Basic skills - Evaluation of Effectiveness. Demonstration - Video conferencing - Method of organizing - Advantages and disadvantages as a teaching learning process. Use of AudioVisual Aids – Importance - General Principles of use - Advantages and disadvantages.							
Techniques of teaching-learning – Small group							
Importance, Skills of using, Evaluation of Effectiveness of the following:							
Group discussion - Collaborative learning - Seminar - Debate - Group investigation - Role play.							
UNIT V INTRODUCTION TO SPSS							6
Introduction to SPSS - Data analysis with SPSS: general aspects, workflow, critical issues - SPSS: general description, functions, menus, commands - SPSS file management.							
LECTURE		TUTORIAL					TOTAL
10		20					30

REFERENCES

1. Davis, Irork (1971), The Management of learning, McGraw Hill, London.
2. Judith, I. (2008). Learners, learning and educational activity. London: Routledge.
3. Graham, R. (2008). Psychology: The key concepts. London: Routledge.
4. Samuel, W. (2007). The intellectual and moral development of the present age. U.S: Kessinger Pub Co
5. Chobra, R. K. (2006). Elements of educational psychology. New Delhi: Arise Publishers.
6. Langer, J. and Applebee, A.N. (1987). How writing shapes thinking: A Study of Teaching and Learning, National Council of Teachers of English.
7. Lindfors, J. (1984). How children learn or how teachers teach? A Profound confusion: Language Arts, 61 (6), 600-606.
8. Vygotsky, L.S. Thought and Language, Cambridge, MA: MIT Press, 1962.
9. Field A., Discovering Statistics Using SPSS, Fourth Edition, SAGE, 2013

Resource Websites:

- <http://www.thirteen.org/edonline/concept2class/constructivism/index.html>.
- www.ipn.uni-kiel.de/projekte/esera/book/b001-cha.pdf
- <http://www.ericdigests.org/1999-3/theory.htm>
- <http://www.ncrel.org/sdrs/areas/issues/students/atrisk/at6lk36.htm>
- <http://saskschoolboards.ca/research/instruction/97-07.htm>
- http://www.ed.psu.edu/CI/Journals/1998AETS/t1_7_freeman.rtf
- http://en.wikipedia.org/wiki/Constructivist_teaching_methods
- <http://www.ncrel.org/sdrs/areas/issues/envrnmnt/drugfree/sa3const.htm>
- <http://vathena.arc.nasa.gov/project/teacher/construc.html>
- <http://www.grout.demon.co.uk/Barbara/chreods.htm>
- <http://vathena.arc.nasa.gov/project/document/teacher.html>
- http://www.disciplineassociates.com/ClassroomDiscipline_101.aspx