PROPOSED SYLLABUS
FOR THE
ACADEMIC YEAR
2019-2020
ONWARDS

M.Phil Computer Science

M.Phil Computer Science

PROGRAMME OUTCOMES:

- ➢ To provide scholars with fundamental strength in analyzing, designing and solving research and industry related problems
- ➢ To prepare Scholars for successful career in academic, industry and research
- ➢ To enable scholars to work in a team with multidisciplinary approach
- ➢ To promote and inculcate ethics and code of professional practice among students

Cauvery College for Women

PG & Research Department of Computer Science

M.Phil Computer Science (2019-2020 Onwards)

Semester	Course	Title of the Course	Course Code	Instruct Hrs/week	Exam. Hours	Credits	Marks		
							IA	UE	Total
I	Course - I	Research Methodology	19MCSC1	6	3	4	25	75	100
	Course - II	Advanced Topics in Computer Science	19MCSC2	6	3	4	25	75	100
	Course – III	Teaching and Learning skills (Common Paper)	19MTLS3	6	3	4	25	75	100
	Course - IV	Paper on Topic of Research (The syllabus will be prepared by the Guide and the examination will be conducted by the COE)	19MCSC4	6	3	4	25	75	100
II	---	**Dissertation and Viva - Voce** Viva Voce - 50 marks Dissertation - 150 marks		-	-	--	8	--	--	200
Total						**24**	**--**	**--**	**600**

19MCSC1	RESEARCH METHODOLOGY	CATEGORY	L	T	P	Credits
		CORE	90	6	-	4

Preamble

➢ To understand the types of research and thesis writing
➢ To learn to use tools related to research in Computer Science
➢ To learn to calculate the computing time of algorithms and ideas related to NP- Completeness
➢ To learn Formal Language of Computer Science, its grammar and its applications
➢ To learn and use probability and applications of probability in areas such as System Reliability
➢ To understand the concepts of Logic and Natural Deduction Systems

Unit I   **(15 Hours)**
Thesis Writing: Research types – objectives and approaches – Literature collection, Web browsing – Software tools – Writing review and journal articles – manuscript publication.
Planning a thesis – general format – page and chapter format – footnotes – tables and figures – references and appendices.
Research Tools in Computer Science: LaTex, R, WEKA, MATLAB, NS2.

Unit II   **(20 Hours)**
Analysis of algorithm: The role of algorithm in computing – Insertion sort – Analyzing and designing algorithms – growth of functions – Divide and Conquer: The Maximum Subarray Problem –Strassen's algorithm for Matrix multiplication – The substitution method and recursion tree methods of solving recurrences - Introduction to NP- completeness.

Unit III   **(20 Hours)**
Formal Languages and Finite Automata: Context free grammars – Derivation trees – Simplification of context free Grammars – Chomsky normal form – Greiback normal form – The pumping lemma for context free languages.
Finite state systems – Basic definitions – Non deterministic finite automata – Finite automata with epsilon moves – Regular expressions – Applications of finite Automata.

Unit IV   **(20 Hours)**
Probability and Statistical Analysis: Probability – Fail time data analysis – Hazard models – Conditional probability – Baye's rule – System reliability – Stochastic process.

Unit V   **(15 Hours)**
Logic – Relations and Functions: Propositions – Precedence rules for operators – Laws of equivalence – Natural deduction system – Developing natural deduction system proofs.

Relation properties – Matrix and Graph – Graph Notations for relations – Partition and covering – Equivalence relation – Compatibility relations – Partial ordering – Functions – Components – Composition of function – Inverse functions – Binary and n-ary operations

Text Books:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	Kothari C. R	Research Methodology – methods and techniques	Wishwa Prakashjan New Delhi	1999
2	Cormen, Leiserson, Rivest and Stein	Introduction to Algorithms	PHI LEARNING PVT. LTD-NEW DELHI	2009
3	John E. Hopcroft,Jeffery D. Ullman	'Introduction to Automata Theory Language and Computation'	narosa Publishing House	1979
4	L.S. Srinath	Reliability Engineering	Affliated East, West press pvt. Ltd, New Delhi	2005
5	David Gries	The Science of Programming	Narosa Publishing House	1981

Reference Books:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	Anderson, Durston and Poole,	'Thesis and Assignment writing',	Wiley Eastern Ltd. ND	1970
2	Misra R.P.	Research Methodology	Concept publishing Company, New Delhi	1988
3	Ellis Horowitz and Sartaj Sahni,	'Fundamentals of Computer algorithms',	Galgotia Publications, New Delhi	2000
4	E. Balagurusamy	Reliability Enginering	Tata McGraw Hill Publishing Ltd., New Delhi	2003
5	Leon S. Levy	Discrete structures of Computer Science	Wiley Eastern Ltd.,	1980

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Recognize the tools related to research in Computer Science	K2
CO2	Analyze the algorithms and compute their computing time	K3
CO3	Apply the basic concepts of NP-Complete and NP-Hard and problems of Computability	K4
CO4	Examine the formal language, context free grammar and the applications of finite automata	K5
CO5	Review the knowledge of Probability, Statistical Analysis and its application for System Reliability	K6

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	M	S
CO3	S	S	M	S
CO4	S	S	M	S
CO5	S	S	S	S

S – Strong;   M – Medium;   L - Low

Pedagogy: Chalk and Talk, Group discussion, Seminar, Assignment, PPT.

Course Designer: Ms.R.Brendha,Ms.S.Latha,Dr.M.Anandhi,Ms.S.Sugunadevi,Ms.N.Sivapriya

19MCSC2	ADVANCED TOPICS IN COMPUTER SCIENCE	CATEGORY	L	T	P	Credits
		CORE	90	6	-	4

Preamble
- ➢ To understand the basic ideas of Data Science and to analyze big data sets
- ➢ To understand the Cloud Computing as an emerging area of public and scientific use and to learn to apply Cloud Computing in the current social and research contexts
- ➢ To learn and apply the ideas of Virtualization and its various uses
- ➢ To appreciate IoT as a fast growing paradigm on Research in Computer Science and to use the same for research
- ➢ To understand the basics of Machine Learning and its application in related areas such as Data Mining, ANN etc
- ➢ To understand the use of Cryptography as a tool of security in the areas of Database, Program and Computer Networks

Unit I : Data Science   (15 Hours)
Big Data and Data Science Hype – Datafication - The Current Landscape -Thought Experiment. Statistical Inference, Exploratory Data Analysis, and the Data Science Process: Statistical Thinking in the Age of Big Data - Exploratory Data Analysis – The Data Science Process.

Big Data : Understanding Big Data: Concepts and Terminology - Big Data Characteristics - Source of Big Data – Big Data Types (Formats) – Big Data Classification – Big Data processing technologies/tools/platforms.Types of Analytics: Analytics- Data Analytics – Big Data Analytics – Health Big Data Analytics – Importance of Analytics – Types: Predictive – Descriptive – Diagnosis – Prescriptive.

UNIT II : Cloud Architecture And Model   (20 Hours)
Technologies for Network-Based UNIT System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:-Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public VS Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

Virtualization: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.

UNIT III : Internet of Things   (20 Hours)
IoT architecture M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model – IoT reference architecture.

Unit IV : Machine Learning (20 Hours)

Types of learning, hypothesis space and inductive bias, evaluation, cross-validation. Linear regression, Decision trees, over fitting- Instance based learning, Feature reduction, Collaborative filtering based recommendation - Probability and Bayes learning - Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM - Neural network: Perceptron, multilayer network, back-propagation, introduction to deep neural network - Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning - Clustering: k-means, adaptive hierarchical clustering, Gaussian mixture model - Concept learning – general to specific ordering – Decision tree learning – ANN.

Unit V : Security problems in Computing (15 Hours)

Cryptography – program security – Database security – Security in Networks

Text Books:

SNO	TITLE	AUTHOR	PUBLICATION/EDITION	YEAR
1	Big Data Fundamentals: Concepts, Drivers & Techniques	by Paul Buhler, Wajid Khattak, Thomas Erl	Prentice Hall Publications	2016
2	Enterprise Cloud Computing	Gautam Shroff	Cambridge University Press	2011
3	Machine Learning	Tom M. Mitchell	McGraw- Hill	1997
4	Internet of Things	Arshdeep Bahga, Vijay Madisetti,	Universities Press	2015
5	Security in Computing	Charles P. Pfleeger & Shani Lawrence Pfeeger,	Pearson Education,	2018

Course Outcomes:

CO No.	CO Statement	Knowledge level
CO1	Design algorithms for various computing problem Understanding the Cloud Computing as an emerging area of public and scientific use and applications of Cloud Computing in the current social and research contexts.	K2
CO2	Assess the knowledge of Virtualization and its various uses for practical applications..	K3
CO3	Appreciation of IoT as a fast growing paradigm of Computer Science and its uses in research.	K4
CO4	Apply the basics of Machine Learning and its application in related areas such as Data Mining, ANN etc.	K5
CO5	Appreciation of Cryptography as a tool of security in the areas of Database, Program and Computer Networks and to pursue further learning of the same.	K6

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	M	S	S
CO3	S	S	S	S
CO4	S	S	S	S
CO5	S	S	S	S

S – Strong;   M – Medium;   L - Low

Pedagogy: Chalk and Talk, Assignment, PPT, Seminar, E-Content.

Course designer: Ms.R.Merlin Packiam, Ms.H.Krishnaveni, Dr.A.Bhuvaneswari, Ms.N.Girubagari, Ms.D.Radhika

19MTLS3	TEACHING AND LEARNING SKILLS	CATEGORY	L	T	P	Credits
		CORE	90	6	-	4

Preamble:

- ➢ Acquaint different parts of computer system and their functions
- ➢ Understand the operations and use of computers and common Accessories
- ➢ Develop skills of ICT and apply them in teaching learning context and Research
- ➢ Appreciate the role of ICT in teaching, learning and Research
- ➢ Acquire the knowledge of communication skill with special reference to its elements, types, development and styles
- ➢ Understand the terms communication Technology and Computer mediated teaching and develop multimedia /e- content in their respective subject
- ➢ Understand the communication process through the web
- ➢ Acquire the knowledge of Instructional Technology and its Applications
- ➢ Develop different teaching skills for putting the content across to targeted audience

Unit I : Computer Application Skills (15 Hours)

Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, Spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations - **ICT for Professional Development** : Concept of professional development; institutional efforts for competency building; individual learning for professional development using professional networks, OERs, technology for action research, etc.

Unit II : Communications Skills (20 Hours)

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and Written; Non-verbal communication – Intrapersonal, interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and Writing – Methods of developing fluency in oral and written communication – Style, Diction and Vocabulary – Classroom communication and dynamics.

Unit III : Pedagogy (20 Hours)

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a Lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation - Versatility of Lecture technique – Demonstration: Characteristics, Principles, planning Implementation and Evaluation – Teaching-learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion.

Unit IV: E- Learning, Technology Integration and Academic Resources in India

(20 Hours)

Concept and types of e-learning (synchronous and asynchronous instructional delivery and means), m-learning (mobile apps); blended learning; flipped learning; E-learning tools (like LMS; software's for word processing, making presentations, online editing, etc.); subject specific tools for e-learning; awareness of e-learning standards- Concept of technology integration in teaching- learning processes; frameworks guiding technology integration (like TPACK; SAMR); Technology Integration Matrix- Academic Resources in India: MOOC, NMEICT; NPTEL; e-pathshala; SWAYAM, SWAYAM Prabha, National academic depository, National Digital Library; e-Sodh Sindhu; virtual labs; eYantra, Talk to a teacher, MOODLE, mobile apps, etc.

Unit V : Skills of Teaching and Technology based assessment   (15 Hours)

Teaching skills: 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 – Evaluation of Teaching Skills- **Technology for Assessment:** Concept of assessment and paradigm shift in assessment; role of technology in assessment 'for' learning; tools for self & peer assessment (recording devices; e-rubrics, etc.); online assessment (open source software's; e-portfolio; quiz makers; e-rubrics; survey tools); technology for assessment of collaborative learning like blogs, discussion forums; learning analytics.

Reference Books:

S.NO	BOOK TITLE	AUTHOR	PUBLICATIONS	YEAR
1.	Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development	Jonathan Anderson and Tom Van Weart,	UNESCO,	2002
2.	www.namahn.com/resources			
3.	Curriculum Reforms and Teaching Methods,	Bela Rani Sharma	Sarup and sons, New Delhi	2007
4.	https://en.wikipedia.org/wiki/Learning_management_system			
5.	MicroTeaching (Vol 1& 2)		Neelkamal Publication,Hyderabad	

Course Outcomes

CO Number	CO Statement	Knowledge Level
CO1	Analyze the skills of ICT and apply them in Teaching Learning context and Research.	**K2**
CO2	Appreciate the role of ICT in teaching, learning and Research.	**K3**
CO3	Develop communication skills with special reference to Listening, Speaking, Reading and Writing.	**K4**
CO4	Develop adequate skills and competencies to organize seminar / conference / workshop / symposium / panel discussion.	**K5**
CO5	Develop skills in e-learning and technology integration.	**K6**

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	S	S	S	S
CO3	S	S	S	S
CO4	S	S	S	S
CO5	S	S	S	S

S – Strong;   M – Medium;   L - Low

Pedagogy: Chalk and talk, PPT, Group Discussion, Quiz, Seminar

Course Designer: Dr.P.Rajeswari, Ms.K.Sangeetha, Dr.A.R.Jasmine Begum, Ms.K.Pradeepa, Ms.J. Sangeetha