

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**  
**NATIONALLY ACCREDITED (III CYCLE) WITH "A" GRADE BY NAAC**  
**TIRUCHIRAPPALLI – 18**

**PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE**

**AUTONOMOUS SYLLABUS**



**M.Sc Computer Science**

**2019-2020**

**and onwards**

## **M.Sc Computer Science**

### **PROGRAMME OUTCOMES**

- Ability to identify, formulate and develop solutions for computational challenges
- Inculcate broad knowledge in core areas of Computer Science and emerging technologies in IT
- Develop Analytical and Technical skills to enhance employment potential
- Capable of integrating knowledge and to provide a gateway for research

**Cauvery College for Women (Autonomous), Trichy-18**

**PG & Research Department of Computer Science**

**M.Sc Computer Science**

**(For the Candidates admitted from the Academic year 2019-2020 and onwards)**

Semester	Course	Title	Course Code	Inst.Hrs/ week	Credits	Exam			Total
						Hrs	Mark		
							Int.	Ext.	
I	Core Course – I (CC)	Mathematical Foundation for Computer Science	19PCS1CC1	6	5	3	25	75	100
	Core Course – II (CC)	Design and Analysis of Algorithms	19PCS1CC2	6	5	3	25	75	100
	Core Course – III(CC)	Web Technologies	19PCS1CC3	6	5	3	25	75	100
	Core Practical – I(CP)	Web Technologies Lab	19PCS1CC1P	6	4	3	40	60	100
	Core Course –IV (CC)	Distributed Operating System	19PCS1CC4	6	5	3	25	75	100
	<b>Total</b>			<b>30</b>	<b>24</b>				<b>500</b>
II	Core Course – V (CC)	Data Mining and Warehousing	19PCS2CC5	6	5	3	25	75	100
	Core Practical–II(CP)	Data Mining Lab and MatLab	19PCS2CC2P	6	4	3	40	60	100
	Core Course - VI (CC)	Artificial Intelligence	19PCS2CC6	6	5	3	25	75	100
	Elective Course-I(EC)	Network Security / Soft Computing/ Advanced Computer Architecture	19PCS2EC1A/ 19PCS2EC1B/ 19PCS2EC1C	6	4	3	25	75	100
	Elective Course-II(EC)	Bioinformatics/ Advanced Database System / Software Project Management	19PCS2EC2A/ 19PCS2EC2B/ 19PCS2EC2C	6	4	3	25	75	100
	<b>Total</b>			<b>30</b>	<b>22</b>				<b>500</b>
III	Core Course –VII (CC)	Computer Science for Competitive Examinations	19PCS3CC7	6	5	3	25	75	100
	Core Course – III(CC)	Big Data Analytics	19PCS3CC8	6	5	3	25	75	100
	Core Practical–III(CP)	Python and R Lab	19PCS3CC3P	6	4	3	40	60	100
	Elective Course-III(EC)	Blockchain / Parallel Processing/ Compiler Design	19PCS3EC3A/ 19PCS3EC3B/ 19PCS3EC3C	6	4	3	25	75	100
	Elective Course-IV(EC)	Robotic Process Automation/ Machine Learning/ IoT	19PCS3EC4A/ 19PCS3EC4B/ 19PCS3EC4C	6	4	3	25	75	100
	SWAYAM ONLINE COURSE	Introduction to Research	To Be Fixed Later	-	2	As per UGC Recommendation			
	<b>Total</b>			<b>30</b>	<b>22</b>				<b>500</b>
	Core Course –IX (CC)	Cloud Computing	19PCS4CC9	6	5	3	25	75	100
	Core Course – X (CC)	Digital Image Processing	19PCS4CC10	6	5	3	25	75	100

IV	Core Practical – IV CP)	FOSS Lab	19PCS4CC4P	6	4	3	40	60	100
	Elective Course- V(EC)	Wireless Sensor Networks/ MANET/ Mobile Computing	19PCS4EC5A/ 19PCS4EC5B/ 19PCS4EC5C	6	4	3	25	75	100
		Project	Project	19PCS4PW	6	4	-	-	-
<b>TOTAL</b>				<b>30</b>	<b>22</b>				<b>500</b>
				<b>120</b>	<b>90</b>				<b>2000</b>

**Note:**

Total No. of Core Papers	- 10
Total No. of Practicals	- 4
Total No. of Elective Papers	- 5
Extra Credit Course	- 1
No. of Projects	- 1

The internal and external marks for theory and practical papers are as follows:

Subject	Internal Marks	External Marks
Theory	25	75
Practical	40	60

Separate passing minimum is prescribed for Internal and External

**For Theory:**

- The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
- The passing minimum for End Semester Examinations shall be 40% out of 75 marks (i.e. 30 marks)
- The passing minimum not less than 50% in the aggregate.

**For Practical:**

- The passing minimum for CIA shall be 40% out of 40 marks (i.e. 16 marks)
- The passing minimum for End Semester Examinations shall be 40% out of 60 marks (i.e. 24 marks)
- The passing minimum not less than 50% in the aggregate.

**For PROJECT:**

Marks for Dissertation	: 80 Marks
Marks for Viva Voice	: 20 Marks
Total Marks	: 100 Marks

<b>Semester I</b>	<b>Internal Marks: 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS1CC1</b>	<b>MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE</b>	<b>CORE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>5</b>

### **Preamble**

To enable the students to learn the basic concepts of Discrete Mathematics, Graph Theory, Fuzzy set Theory and combinatorics.

### **Syllabus**

#### **UNIT I (12 HOURS)**

Statements and notation- connectives- Tautologies- Equivalence of formulas- Theory of inference for the statement calculus.

#### **UNIT II (18 HOURS)**

Partial ordering- Partially Ordered Set: representation and Associated Terminology Lattices and Boolean Algebra-Lattices as partially ordered sets- Definition and examples- Some properties of lattices – Boolean Algebra- Definition and examples – Sub algebra, direct product and homomorphism. Fundamental principles of counting: Permutations- Combinations: The Binomial theorem- combinations with repetition- Relations and functions- The Pigeonhole principle – the principle of Inclusion and Exclusion: The principle of Inclusion and Exclusion- Recurrence relations- First order linear Recurrence Relation.

#### **UNIT III (20 HOURS)**

Definition of a Graph – finite & infinite graphs – incidence, degree isolated & pendent Vertices – isomorphism –sub graphs – walks , paths & circuits –Connected & disconnected graphs – components –Euler graphs - Operations on Graphs –More on Euler graphs –Hamiltonian paths &circuits.

#### **UNIT IV (20 HOURS)**

Trees –properties of trees –pendent vertices in a tree – distances & centers in a tree – Rooted & binary trees – Spanning trees –Fundamental circuits – Finding all spanning trees of a Graph – Spanning trees in a weighted graph.

#### **UNIT V (20 HOURS)**

From Classical Sets to Fuzzy Sets, Fuzzy Sets Verses Crisp Sets: Fuzzy Sets: Basic types- Fuzzy sets: Basic Concepts – Additional Properties of  $\alpha$  – cuts – Extension Principle for fuzzy sets. Operations on Fuzzy Sets: Types of operations – Fuzzy complements – Fuzzy Intersections: t-Norms – Fuzzy Unions: t- Conorms – Combinations of Operations.

### **Text Books:**

<b>S.NO</b>	<b>AUTHORS</b>	<b>TITLE</b>	<b>PUBLISHERS</b>	<b>YEAR OF PUBLICATION</b>
1	Tremblay J. P., Manohar.R.	Discrete Mathematical Structures With Applications To Computer Science	Tata McGraw- Hill Publishing Company Limited, NewDelhi	1997
2	Narsingh Deo	Graph Theory With Applications To Engineering & Computer Science	Prentice Hall of India, NewDelhi	1997

3	G.J.Klir , B.Yuan	Fuzzy Sets Logic And fuzzy	Prentice Hall of India, New Delhi	2001
4	Ralph, P. Grimaldi	Discete And Combinatorial Mathematics	Pearson Asia Education	Reprint 2002

### Reference Books

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	G.J. M.Ganesh	Introduction To Fuzzy Sets And Logic	Prentice-Hall of India, New Delhi	2006
2	Dr.S. Arumugam, Dr. S.Ramachandran	Invitation To Graph Theory	Scitech Publications India Pvt Limited, Chennai	2001
3	Seymour Lipschutz , Marc Laris Lipson	Schuam's Outlines Discrete Mathematics	Tata McGraw- Hill Publishing Co., Ltd., New Delhi	1999

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the concepts of Permutation	K2
CO2	Apply the concepts of connectives , theory of inference for the statement calculus and fuzzy set theory	K3
CO3	Examine basic terminologies in graph to draw various kinds of graphs	K4
CO4	Differentiate the theory of Boolean Algebra and Lattices	K4
CO5	Develop the concepts of trees	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.

### Course Designer

Ms.S. Saridha

<b>Semester I</b>	<b>Internal Marks: 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS1CC2</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	<b>CORE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>5</b>

### **Preamble**

- To learn the techniques for effective problem solving in computing
- Apply important algorithmic design paradigms and methods of analysis
- Analyze the asymptotic performance of algorithms to show the efficiency of the algorithm
- Write rigorous correctness proofs for algorithms
- Demonstrate a familiarity with major algorithms and data structures

### **Syllabus**

#### **UNIT I (15 HOURS)**

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs-Analysis.

#### **UNIT II (20 HOURS)**

Divide and Conquer: The General Method – Binary search-Merge Sort – Quick Sort – Selection sort-Heap sort-Analysis. The Greedy Method: General Method - Container Loading- Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths-Analysis.

#### **UNIT III (20 HOURS)**

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees -String Editing - 0/1 Knapsack - Reliability Design - The Traveling Sales person Problem - Flow Shop Scheduling – Analysis.

#### **UNIT IV (20 HOURS)**

Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS- Analysis. Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: The Method - 0/1 Knapsack Problem.- Analysis.

#### **UNIT V (15 HOURS)**

NP-HARD and NP-COMPLETE PROBLEMS: Basic concepts-NP-HARD Graph problems-NP-HARD scheduling problems-NP-HARD Code generation problems-Analysis

### **Text Book**

<b>S.NO</b>	<b>TITLE</b>	<b>AUTHOR</b>	<b>PUBLICATION/EDITION</b>	<b>YEAR</b>
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran	Universities Press, Second Edition	2015

## Reference Books

S.NO	TITLE	AUTHOR	PUBLICATION/EDITION	YEAR
1	Data structures and Algorithms	V.Aho, Hopcroft, Ullman	Pearson Education, 4 th Edition	2009
2	Introduction to the Design and Analysis of Algorithms	Anany Levitin	Third Edition, Pearson Education	2012
3	Design & Analysis of Algorithms	Gajendra Sharmah	Khanna Publishers;4 edition	2015

## Web References

1. <http://nptel.ac.in/courses/106101059/>
2. <http://nptel.ac.in/courses/106101060/>
3. <http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html>
4. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-toalgorithms-fall-2011/lecture-videos/>
5. <http://cs.uef.fi/pages/franti/asa/notes.html>

## Course Outcomes

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

CO Number	CO Statement	Knowledge level
CO1	Design algorithms for various computing problems.	K3
CO2	Analyze the time and space complexity of algorithms.	K4
CO3	Critically analyze the different algorithm design techniques for a given problem	K5
CO4	Assess/Compare the efficiency of the algorithm	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

S– Strong; M–Medium; L -Low

## Pedagogy

Chalk&talk, Assignment, PPT, Seminar,E-Content.

## Course designer

Ms. K.Sangeetha



<b>Semester I</b>	<b>Internal Marks: 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS1CC3</b>	<b>WEB TECHNOLOGIES</b>	<b>CORE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>5</b>

### **Preamble**

- This Subject is useful for Making own Web page and how to host own web site on internet. Along with that Students will also learn about the protocols involve in internet technology
- To initiate PHP language for server side scripting, To establish XML and processing of XML Data with Java, To introduce Server side programming with Java Servlets and JSP, To commence Client side scripting with Javascript and AJAX,
- To analyse the basics involved in publishing content on the World Wide Web, To transform graduates with potential in computational into experts in information technology that the industry requires from time to time

### **Syllabus**

#### **UNIT I (16 HOURS)**

Web Essentials - Clients, Servers, and Communication. The Internet-Basic Internet Protocols - The World Wide Web-HTTP request message-response message-Web Clients - Web Servers-. Markup Languages: .An Introduction to HTML History-Versions-Basic HTML Syntax and Semantics- Some Fundamental HTML Elements-Relative URLs-Lists-tables- Frames-Forms.

#### **UNIT II (18 HOURS)**

Style Sheets - CSS -Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Role Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout-Beyond the Normal Flow-Other Properties.

#### **UNIT III (16 HOURS)**

Client- Side Programming - The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax Variables and Data Types-Statements- Operators- Literals-Functions-Objects- Arrays-Built-in Objects-JavaScript Debuggers.

#### **UNIT IV (20HOURS)**

Server-Side Programming - Java Servlets- Architecture -Overview-A Servlet- Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies- URL Rewriting - Data Storage Servelets and Concurrency. RMI Architecture - Working With RMI - Application Development With RMI - Created Distributed Application Development With RMI.

#### **UNIT V (20 HOURS)**

Representing Web Data - XML-Documents and Vocabularies-Versions and Declaration-Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents- Selecting XML Data:XPath-Template based Transformations: XSLT-Displaying XML Documents inBrowsers.

### **Text Book**

<b>S.NO</b>	<b>BOOK TITLE</b>	<b>AUTHOR</b>	<b>PUBLICATIONS</b>
1.	Web Technologies-A Computer Science Perspective	Jeffrey C.Jackson	Pearson Education, 2009.

## Reference Books

S.NO	BOOK TITLE	AUTHOR	PUBLICATIONS
1.	"Programming the World Wide Web	Robert. W. Sebesta	Fourth Edition, Pearson Education, 2007
2.	Internet & World Wide Web How To Program	Deitel, Deitel, Goldberg	ThirdEdition, Pearson Education, 2006
3.	Core Web Programming	Marty Hall and Larry Brown	Second Edition, Volume I and II, Pearson Education, 2001
4.	Developing Web Applications	Bates	Wiley, 2006
5.	The Complete Reference – JAVA	Herbert Schildt	7 th Edition, TMH, 2012

## Web References

1. [www.w3schools.com](http://www.w3schools.com)
2. [www.geeksforgeeks.org/web-technology/](http://www.geeksforgeeks.org/web-technology/)
3. [www.guide.freecodecamp.org](http://www.guide.freecodecamp.org)
4. [www.alphadevx.com](http://www.alphadevx.com)

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the processing of XML Data with Java	K2
CO2	Apply suitable scripting languages for Client side and Server side programming	K3
CO3	Analyze the basics involved in publishing content on the World Wide web	K4
CO4	Assess oneself to get employment with this practical hands on training.	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

S– Strong; M–Medium; L -Low

## Pedagogy

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

## Course Designer

Ms.S.Udhayapriya

Semester I	Internal Marks: 40			External Marks:60		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS1CC1P	WEB TECHNOLOGIES LAB	CORE	90	-	6	4

### Preamble

To provide fundamental concept of Internet, JavaScript, XML, Servlet with a view to developing professional software development skills.

1. Develop your college web portal using HTML.
2. To develop a Style Sheet using Link, Table, Box, List and Positioning.
3. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to uppercase.
4. Write a JavaScript code block, which validates a username and password.
  - a) If either the name or password field is not entered display an error message.
  - b) The fields are entered do not match with default values display an error message.
  - c) If the fields entered match, display the welcome message.
5. Write a program in Java to implement a Client/Server application using RMI.
6. Write a program in Java to create a Cookie and set the expiry time of the same.
7. Write a program in Java to create Servlet to count the number of visitors to a webpage.
8. Write a program in Java to create a form and validate a password using Servlet.
9. Write a XML program for job listing in HTML.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize the usage of HTML Tags	K2
CO2	Demonstrate the usage of Java Script	K3
CO3	Experiment the client/server application using RMI	K4
CO4	Develop web application using XML, Servlet	K5

### Mapping with Programme Outcomes

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

S– Strong; M–Medium; L –Low

### Pedagogy

Demonstration

### Course Designer

Ms.S.Udhayapriya

Semester I	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS1CC4	DISTRIBUTED OPERATING SYSTEM	CORE	90	6	-	5

### Preamble

- To understand about the distributed computing system models, file models and the architecture of DSM.
- To know how to solve the security problems.

### Syllabus

#### UNIT I (12 HOURS)

Fundamentals: What is Distributed Operating System-Evolution of Distributed Computing system –Distributed Computing System models-Why are Distributed Computing Systems gaining popularity-What is a Distributed Computing System-Issues in Designing Distributed Computing System –Introduction to Distributed Computing Environment. Introduction to Computer Networks-Network types-LAN-WAN-Communication protocols- Internetworking-ATM Technology.

#### UNIT II (18 HOURS)

Message Passing: Introduction – Desirable features-Issues in IPC Message Passing-Synchronization-Buffering – Multidatagram Messages-Encoding and Decoding-Process Addressing – Failure Handling-Group Communication.

#### UNIT III (20 HOURS)

Distributed Shared Memory: Introduction – General Architecture of DSM system- Design and Implementation Issues of DSM – Granularity-Structure of Shared Memory- Replacement strategy-Thrashing-Heterogeneous DSM – Advantages. Synchronization: Introduction Clock Synchronization – Event Ordering –Mutual Exclusion – Deadlock-Election Algorithm.

#### UNIT IV (20 HOURS)

Distributed File System: Introduction-Desirable features- File models-File Accessing Models-File Sharing Semantics – File Caching Schemes – File Replication-Fault Tolerance- Atomic Transactions-Design Principles.

#### UNIT V (20HOURS)

Security: Introduction – Potential Attacks to Computer system –Cryptography- Authentication- Access Control- Digital Signatures – Design Principles.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBLICATION
1.	Pradeep K Sinha	Distributed Operating Systems	PHI	2012

## ReferenceBooks

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBLICATION
1	Andrew S Tanenbaum	Distributed Operating Systems	PHI	2007

## WebReferences

- [http://www.darshan.ac.in/Upload/DIET/Documents/CE/2160710\\_Distributed\\_Operating\\_System\\_GTU\\_Study\\_Material\\_2017\\_22042017\\_033831AM.pdf](http://www.darshan.ac.in/Upload/DIET/Documents/CE/2160710_Distributed_Operating_System_GTU_Study_Material_2017_22042017_033831AM.pdf)
- <http://www.coda.cs.cmu.edu/ljpaper/lj.html>
- [http://www.windowsnetworking.com/articles\\_tutorials/Windows2003-Distributed-File-System.html](http://www.windowsnetworking.com/articles_tutorials/Windows2003-Distributed-File-System.html)

## Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the architecture of DSM	K2
CO2	Determine the difficulties of distributed memory management	K3
CO3	Compare centralized and distributed system	K4
CO4	Predict effective synchronization techniques to be performed to run a task in a distributed system	K6

## Mapping with Programme Outcomes

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

S– Strong M–Medium L –Low

**Pedagogy** Chalk and talk and Seminar

**Course Designer** Ms.K.Pradeepa

<b>Semester II</b>	<b>Internal Marks: 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS2CC5</b>	<b>DATA MINING AND WAREHOUSING</b>	<b>CORE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>5</b>

### **Objective**

- Able to understand the basic concepts of data mining
- Provides an overview of various applications of data mining
- Gain knowledge about various data mining techniques like classification, clustering, association rule mining

### **Syllabus**

#### **UNIT-I (16HOURS)**

Introduction: What is Data mining? – Data mining on what kind of data – Data mining functionalities (What kinds of Patterns can be mined) – Major Issues in Data mining –Data mining Trends and Research Frontiers: Mining Complex Data types – Other Methodologies – Data mining Applications – Data mining Trends.

#### **UNIT-II (16HOURS)**

Data Pre-Processing: Data Cleaning – Data Integration - Data Reduction – Data Transformation and Data Discretization. Mining Frequent Patterns, Associations: Basic concepts – Frequent Itemset Mining Methods.

#### **UNIT-III (18HOURS)**

Advanced Pattern Mining: Pattern Mining - A Road Map – Pattern Mining in Multilevel, Multidimensional Space. Data Warehousing: Basic Concepts – Data Warehouse Modeling - Data Warehouse Design and usage - Data Warehouse Implementation.

#### **UNIT-IV (20HOURS)**

Classification : Basic concepts- Decision Tree Induction - Bayesian Classification – Rule Based Classification –Model Evaluation and Selection- Techniques to improve Classification Accuracy – Advanced Methods: Classification by Back Propagation – Support Vector Machines – Lazy Learners: K-Nearest-Neighbor Classifiers.

#### **UNIT-V (20HOURS)**

Cluster analysis: Basic concepts and methods – Cluster analysis - Partitioning methods - Hierarchical Methods - Density Based Methods - Grid Based Methods. Advanced Cluster Analysis: Clustering High Dimensional data. Outlier Detection: Outlier and outlier analysis.

### **Text Book**

<b>S.NO</b>	<b>AUTHOR</b>	<b>TITLE OF THE BOOK</b>	<b>PUBLISHER/ EDITION</b>	<b>YEAR OF PUBLICATION</b>
1.	Jiawei Han, Micheline Kamber, Jian Pei	Data Mining: Concepts and Techniques	Morgan Kaufman Publishers, Third Edition	2012

## Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1.	Margaret H.Dunham	Data Mining Introductory and Advanced Topics	Pearson Education	2006
2.	C.S.R. Prabhu	Data Warehousing: Concepts, Techniques, Products and Applications	PHI Learning Private Ltd. Second Edition	2008
3.	K.P. Soman, Shyam Diwakar, V. Ajay	Insight into Data Mining Theory and Practice	PHI	2008.

## Web References

1. [www.tutorialride.com/data-mining/data-mining-tutorial.htm](http://www.tutorialride.com/data-mining/data-mining-tutorial.htm)
2. [https://hanj.cs.illinois.edu/bk3/bk3\\_slidesindex.htm](https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm)
3. [www.guru99.com/datawarehouse-architecture.htm](http://www.guru99.com/datawarehouse-architecture.htm)
4. [www.tutorialpoint.com/dwh/dwh\\_data\\_warehousing.htm](http://www.tutorialpoint.com/dwh/dwh_data_warehousing.htm)

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize basic concepts of data mining	K2
CO2	Review data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	K3
CO3	Assess the methods and techniques appropriate for the task	K5

## Mapping with Programme Outcomes

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

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

S– Strong; M–Medium; L -Low

## Pedagogy

Chalk and Talk, Discussion, Lecture

## Course Designer

Ms. S. Udhayapriya

Semester II	Internal Marks: 40			External Marks:60		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2CC2P	DATA MINING LAB AND MATLAB	CORE	90	-	6	4

### Objective

- Provides rich implementation experience in data mining techniques
- Able to preprocess and Visualize data using Weka tool
- Gain knowledge to develop application using Matlab

### WEKA Tool:

Preprocessing  
Association rules  
Classification  
Clustering  
Data Visualization  
Experimenter  
Knowledge Flow

### MATLAB:

Basic Operations  
Regression  
Classification Ensemble  
Basic graphic applications

### Web References

1. <https://www.tutorialride.com/>
2. <https://www.slideshare.net/>
3. <https://in.mathworks.com/>

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the features of data mining tools	K3
CO2	Analyze the performance of various classification and clustering algorithm	K4
CO3	Interpret Regression techniques using MATLAB	K6
CO4	Apply Basic graphic applications in MATLAB	K3

### Mapping with Programme Outcomes

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

S– Strong; M–Medium; L –Low

### Pedagogy

Demonstration

Course Designer Ms.S. Udhayapriya



Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2CC6	ARTIFICIAL INTELLIGENCE	CORE	90	6	-	5

### Objective

- To foster the development and understanding of Artificial Intelligence and its applications worldwide
- To promote interdisciplinary exchanges between Artificial Intelligence and other fields of information processing
- To gain knowledge based on information through learning

### Syllabus

#### UNIT I

(18HOURS)

Introduction to Artificial Intelligence and Problem solving: Definition - AI problems- What is AI Technique- Defining the problem as state space search- Production systems. Heuristic Search techniques: Best-First Search– Constraint Satisfaction-Means-End Analysis.

#### UNIT II

(18 HOURS)

Knowledge Representation Issues: Representations and mappings -Approaches to Knowledge representations. Using Predicate Logic: Representing simple facts in logic- Representing Instance and ISA relationships - Computable functions and predicates - Resolution.

#### UNIT III

(20 HOURS)

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming- Backward vs Forward Reasoning. Statistical Reasoning: Probability and Baye's Theorem- Bayesian Networks-Dempster-Shafer Theory.

#### UNIT IV

(18 HOURS)

Learning from Observations: Forms of Learning-Inductive Learning-Learning Decision tree-Ensemble Learning.

#### UNIT V

(16 HOURS)

Knowledge in Learning: A Logical formulation of Learning- Knowledge in Learning- Explanation based learning-Learning using Relevance Information.

### Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1	Elaine Rich, Kevin Knight, Shivashankar B Nair (Unit 1–3)	Artificial Intelligence	Tata McGraw Hill, 3 <sup>rd</sup> edition	2009
2	Stuart Russel, Peter Norvig (Unit 4- Unit 5)	Artificial Intelligence- A Modern Approach	Pearson Education, 3 <sup>rd</sup> edition	2010

## References Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1	Rajendra Akerkar	Introduction to Artificial Intelligence	PHI Learning Pvt Ltd, 2 <sup>nd</sup> edition	2014
2	Ben Coppin	Artificial Intelligence Illuminated	Jones and Bartlett	2004

## Web References

1. <http://www.formal.stanford.edu/jmc/whatisai/>
2. [http://www.sciencedaily.com/news/computers\\_math/artificial\\_intelligence/](http://www.sciencedaily.com/news/computers_math/artificial_intelligence/)

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Apply the basic knowledge representation and learning methods	K3
CO2	Examine techniques for handling incomplete and uncertain models	K4
CO3	Formulate a system for solving a particular problem	K5

## Mapping with Programme Outcomes

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

S– Strong; M–Medium; L -Low

**Pedagogy** Chalk and Talk , PPT , Discussion, Assignment, Quiz, Case study

**Course designer** Dr.P.Rajeswari

Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2EC1A	NETWORK SECURITY	ELECTIVE	90	6	-	4

### Objective

- Overview the principles of cryptography and Network Security
- Inculcate the classical and advanced encryption standards and technique
- Gain knowledge in establishing IP security

### Syllabus

#### UNIT I

(18 HOURS)

Introduction: Security Trends - The OSI Security Architecture - Security Attacks - Security Services - A model for network Security. Classical Encryption Techniques: Symmetric Cipher Model - Substitution Techniques - Transposition Techniques – Steganography.

#### UNIT II

(20HOURS)

Block Ciphers and the DES: Block cipher Principles - The DES - The Strength of DES - Differential and Linear Crypt Analysis. Public key cryptography and RSA: Principles of Public Key Cryptosystems – The RSA Algorithm.

#### UNIT III

(20 HOURS)

Digital Signatures and Authentication Protocols: Digital Signatures - Authentication Protocols - Digital Signature Standard. Authentication Applications: Kerberos - X.509 Authentication Service, Public-Key Infrastructure. Email Security: Pretty Good Privacy - S/MIME.

#### UNIT IV

(20 HOURS)

IP Security: IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload. Web Security: Security Considerations - SSL and TLS-SET.

#### UNIT V

(12 HOURS)

System Security: Intruders - Intrusion Detection – Password Management. Malicious Software: Viruses and Related Threats. Firewalls: Design Principles - Trusted systems.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1	William Stallings	Cryptography and Network Security - Principles and Practices	Prentice Hall of India, 4th edition	2007

### References Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1	AtulKahate	Cryptography and Network Security	Tata McGraw Hill, New Delhi	2006
2	Charles P Pfleeger, Shari Lawrence Pfleeger	Security in Computing	Pearson education, New Delhi	2006

## Web References

1. <https://www.open.edu/openlearn/science-maths-technology/computing-and-ict/systems-computer/network-security/>
2. [scs.carleton.ca/~paulv/5900wBooks.html](https://scs.carleton.ca/~paulv/5900wBooks.html)
3. [https://en.wikipedia.org/wiki/Network\\_security](https://en.wikipedia.org/wiki/Network_security)
4. <https://www.slideshare.net/HatemMahmoud/network-security-applications-4562405>
5. <https://www.intechopen.com/books/security-enhanced-applications-for-information-systems/cybersecurity-in-the-real-world>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand cryptography , network security concepts with its applications	K2
CO2	Apply security principle in system design	K3
CO3	Analyze network security protocols	K4
CO4	Detect network security threat	K5
CO5	Design the code to implement a cryptographic algorithm	K6

## Mapping with Programme Outcomes

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

S– Strong; M–Medium; L -Low

## Pedagogy

Chalk and Talk , PPT , Discussion, Assignment

## Course designer

Ms.D.Radhika

Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2EC1B	SOFT COMPUTING	ELECTIVE	90	6	-	4

### Objective

- To educate the concepts of neural networks and the role of neural networks in intelligent systems
- To provide the basic knowledge in fuzzy
- To apply fitness function using genetic algorithm

### Syllabus

#### UNIT I

(20 HOURS)

Neural Networks : Fundamentals of Neural Networks – Basic Concepts of Neural Networks – Model of an Artificial Neuron – Neural Network Architecture – Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architecture – Back Propagation Network – Architecture of Back Propagation Network – Back Propagation Learning.

#### UNIT II

(20 HOURS)

Neural Network Associative Memory: Auto Correlations – Hetero Correlations – Exponential BAM – Associative Memory for Real Coded Pattern Pairs – Adaptive Resonance Theory – Introduction – ART1 – ART 2 – Applications.

#### UNIT III

(20 HOURS)

Fuzzy Set Theory: Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Method - Applications .

#### UNIT IV

(20 HOURS)

Genetic Algorithms: History – Basic Concepts – Creation of off Springs – Working Principle – Encoding – Fitness Function – Reproduction Genetic Modeling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator –Applications – Advances in Genetic Algorithm .

#### UNIT V

(10 HOURS)

Hybrid System: Integration of Neural Network – Fuzzy Logic – Genetic Algorithm- Hybrid System – Neural Network – Fuzzy Logic – Genetic Algorithm Weight Determination – Application – Fuzzy Back Propagation Network – Language Recognition Type Fuzzy Members – Fuzzy Neuron – Fuzzy Back Propagation Architecture – Learning in Fuzzy Back Propagation – Applications – Knowledge Base Evaluation.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	S.Rajasekaran and G.A.Vijayalakshmi Pai	Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications	Prentice Hall India Learning Private Limited	2011

**Reference Books**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Vinoth Kumar and R. Saravana Kumar	Neural Network and Fuzzy logic	S.K. Katria & Sons	2012
2.	Haykin Simon	Neural Networks and Learning Machines	3/e, Prentice Hall of India	2011
3.	Tang, Tan and Yi	Neural Networks: Computational Models and Application	Springer Verlag Publications	2010

**Web References**

1. [www.tutorialspoint.com/ neural networks](http://www.tutorialspoint.com/neural_networks)
2. [www.sciencedirect.com/ fuzzysset](http://www.sciencedirect.com/fuzzysset)
3. [https// in.geeksforgeeks.org/geneticalgorithm](https://in.geeksforgeeks.org/geneticalgorithm)

**Course Outcomes**

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Describe the concepts of soft computing and their applications	K1
CO2	Discuss supervised and unsupervised learning in neural networks	K2
CO3	Apply soft computing techniques for small applications	K3
CO4	Analyze various soft computing techniques suitable for real time	K4

**Mapping with Programme Outcomes**

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

S– Strong; M–Medium; L – Low

**Pedagogy**

Lectures, Demonstration

**Course Designer**

Mrs.R.RitaJenifer

Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2EC1C	ADVANCED COMPUTER ARCHITECTURE	ELECTIVE	90	6	-	4

### Objective

- To understand the micro-architectural design of processors
- To learn about the various techniques used to obtain performance improvement and power savings in current processors
- To gain knowledge in distributed and Parallel Computing Architecture

### Syllabus

#### UNIT I (10 HOURS)

Review of Fundamentals of CPU, Memory and IO – Trends in Technology, Power, Energy and Cost, Dependability – Performance Evaluation.

#### UNIT II (20 HOURS)

ILP Concepts – Pipelining Overview – Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple Instruction Issue – Hardware Based Speculation – Static Scheduling – Multi-Threading – Limitations of ILP – Case Studies.

#### UNIT III (20HOURS)

Vector Architecture – SIMD Extensions – Graphics Processing Units – Loop Level Parallelism.

#### UNIT IV (20 HOURS)

Symmetric and Distributed Shared Memory Architectures – Performance Issues – Synchronization – Models of Memory Consistency – Case Studies: Intel I7 Processor, SMT & CMP Processors.

#### UNIT V (20HOURS)

Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1	John L Hennessey, David A Patterson	Computer Architecture A Quantitative Approach	Morgan Kaufmann Elsevier ,Fifth Edition	2012

## ReferenceBooks

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Kai Hwang , Faye Brigg	Computer Architecture And Parallel Processing	Mc Graw-Hill International Edition	2000
2	Sima D, Fountain T, Kacsuk P	Advanced Computer Architectures: A Design Space Approach	Addison Wesley	2000

## WebReferences

1. [www.cs.iitk.edu.in/](http://www.cs.iitk.edu.in/)
2. [https://en.m.wikipedia.org / Wiki/ instruction level parallelism](https://en.m.wikipedia.org/wiki/instruction_level_parallelism)
3. <https://passlab.github.io/CSE565/note>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Review Instruction level parallelism	K2
CO2	Analyze the Performance of different level parallelism techniques	K4
CO3	Manage Cache and Memory Related Issues in Multi-Processors	K5

## Mapping with Programme Outcomes

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

S– Strong; M–Medium; L - Low

**Pedagogy** Chalk and talk and Seminar

**Course Designer** Ms.R. RitaJenifer



Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2EC2A	BIOINFORMATICS	ELECTIVE	90	6	-	4

### Objective

- To get the basic knowledge of bioinformatics
- To analyze and use tools and databases for text mining
- To gain deeper knowledge on FAST and BLAST

### Syllabus

#### UNIT I (15HOURS)

Introduction-Historical Overview- Bioinformatics Applications- Bio informatics Major Databases- Molecular Biology.

#### UNIT II (18 HOURS)

Sequence Visualization- Structure Visualization- Statistical Concepts- Micro Arrays- Imperfects Data- Quantitative Randomness- Data Analysis- Tool Selective and Statistics Of Alignment- Clustering and Classification.

#### UNIT III (20 HOURS)

Methods & Technology Overview- Infrastructure, Pattern Recognition & Discovery- Machine Learning- Text Mining & Tools- Dot Matrix Analysis- Substitution Matrix- Dynamic Programming- Word Methods, Multiple Sequence Alignment- Tools for Pattern Matching.

#### UNIT IV (20HOURS)

Drug Discovery- Fundamentals- Protein Structure- System Biology- Collaboration & Communications-Standards and Issues.

#### UNIT V (17 HOURS)

Introduction- Working with FASTS-Working with BLAST, FASTA & BLAST Algorithms & Comparison.

### Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Bioinformatics- Methods & Application	S.C.Rastogi, P.Rastogi, N.Mendiratta	PHI,4 <sup>th</sup> Edition	2013
2.	Bioinformatics Computing	Bryan Bergeron	Pearson Education, 1 <sup>st</sup> Edition	2002

## Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Elementary Bioinformatics	Imtiyaz Alam Khan	Pharma Book syndicate	2005
2.	Environmental Biotechnology	Indu Shekhar Thakur (IST)	IK International publication, 2 <sup>nd</sup> Edition, 2002	

## Web References

1. <https://en.wikipedia.org/wiki/Bioinformatics>
2. [https://academic.oup.com/bioinformatics/pages/instructions\\_for\\_authors](https://academic.oup.com/bioinformatics/pages/instructions_for_authors)
3. <https://blast.ncbi.nlm.nih.gov/Blast.cgi>
4. <https://www.slideshare.net/RIZWANABBAS3/bioinformatics-on-internet>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Define molecular biology and bioinformatics applications	K1
CO2	Discuss the sequences using data analysis tool	K2
CO3	Sketch the data mining and pattern matching tools	K3
CO4	Summarize the molecular modeling and simulation technologies and software that are used to study a wide range of molecular phenomena in biology and medicine	K5
CO5	Interpret the BLAST and FASTA algorithms to find the similarity between protein and DNA sequences.	K6

## Mapping with Programme Outcomes

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

S– Strong; M–Medium; L -Low

## Pedagogy

Chalk and Talk, Lecture, Demonstration, PPT, Discussion, Quiz

## Course Designer

Ms D.Radhika

Semester II	Internal Marks: 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS2EC2B	ADVANCED DATABASE SYSTEM	ELECTIVE	90	6	-	4

### Objective

- Overview the advanced concepts of Database Management System
- Information retrieval using NoSQL database
- Incorporate transaction management with ACID properties

### Syllabus

#### Unit I

(16 HOURS)

Parallel Database: Introduction - Architecture for Parallel Databases - Parallel Query Evaluation - Parallelizing Individual Operations - Parallel Query Optimization.

#### Unit II

(20 HOURS)

Distributed Database - Distributed DBMS Architectures - Storing Data in a Distributed DBMS - Distributed Catalog Management - Distributed Query Processing - Updating Distributed Data Distributed Transaction - Distributed Concurrency Control - Distributed Recovery.

#### Unit III

(18 HOURS)

Object Database System : Motivating Example - Structured Data Types - Operations on Structured Data - Encapsulation and ADTs - Inheritance - Object, OIDs and Reference Types – Database Design for ORDBMS - ORDBMS Implementation Challenges - OODBMS - Comparing RDBMS, OODBMS, and ORDBMS.

#### Unit IV

(18 HOURS)

Transactions : Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery –Media Recovery – Two Phase Commit - SQL Facilities for recovery – Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock-Serializability – Recovery Isolation Levels.

#### Unit V

(18 HOURS)

Advanced Databases Information retrieval: Introduction - Indexing for Text Search - Web Search Engines- Managing Text in a DBMS - Data Model for XML - XQuery. Spatial data management: Types of Spatial Data and Queries - Applications Involving Spatial Data. NoSQL databases: Introduction - Column oriented stores- Key -Value stores - Document databases - Graph databases. Introduction to Mapreduce andHadoop.

### Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER S /EDITION	YEAR OF PUBLICATION
1	Ramez Elmasri Shamkant B. Navathe	Fundamentals of Database Systems	Pearson / Addison Wesley, 4 <sup>th</sup> Edition	2007
2	Thomas Connolly and Carlolyn Begg	Database Systems, A Practical Approach to Design, Implementation and Management	Pearson Education, 3rd Edition	2003

## ReferenceBooks

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Abraham Silberschatz, Henry F. Korth and S. Sudharshan	Database System Concepts	Tata McGraw Hill, 5 <sup>th</sup> Edition	2006
2	Raghu Ramakrishnan , Johannes Gehrke	Database Management System	McGraw Hill Higher Education, 3 <sup>rd</sup> Edition	2007
3	G.K.Gupta	Database Management systems	Tata McGraw Hill Private Limited	2011
4	Shashank Tiwari	Professional NoSQL	John Wiley & Sons	2011

## WebReferences

1. [web.cs.wp.edu](http://web.cs.wp.edu)
2. [www.commonlounge.com](http://www.commonlounge.com)

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of parallel database and query	K2
CO2	Apply distributed transaction and concurrency control	K3
CO3	Test various queries ORDBMS and OODBMS	K4
CO4	Combine Advanced databases like Spatial and XML databases for handling data	K5
CO5	Deduct applications with Map Reduce concept	K6

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	M
CO2	S	S	M	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, Lecture, Discussion, Quiz, Demonstration, PPT

## Course Designer

Ms.G.Sujatha

<b>Semester II</b>	<b>Internal Marks: 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS2EC2C</b>	<b>SOFTWARE PROJECT MANAGEMENT</b>	<b>ELECTIVE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>4</b>

### **Objective**

- Overview the key aspects of a software project and planning
- Prepare and managing software cost
- Understand the concept of risk engineering and continuous process improvement

### **Syllabus**

#### **Unit I (15 HOURS)**

Software Management Renaissance: Conventional Software Management – Evolution of Software Economics – Improving Software Economics – The Old Way and the New.

#### **Unit II (15 HOURS)**

A Software Management Process Framework: Live-Cycle Phases – Artifacts of the Process – Model-Based Software Architectures – Work Flows of the Process – Check Points of the Process.

#### **Unit III (20 HOURS)**

Software Management Disciplines – I: Iterative Process Planning – Project Organizations and Responsibilities – Process Automation.

#### **Unit IV (20 HOURS)**

Software Management Disciplines – II: Project Control and Process Instrumentation – Tailoring the Process

#### **Unit V (20 HOURS)**

Risk Management: Introduction – Risk – Categories of risk – A framework for dealing with risk – Risk Identification – Risk assessment – Risk Planning – Risk Management – Evaluating risks to schedule – Applying the PERT Technique – Monte Carlo Simulation – Critical Chain Concepts

### **Text Book**

<b>S.NO</b>	<b>AUTHOR</b>	<b>TITLE OF THE BOOK</b>	<b>PUBLISHERS / EDITION</b>	<b>YEAR OF PUBLICATION</b>
1.	Walker Royce	Software Project Management	Addison-Wesley	2006

### **Reference Books**

<b>S.NO</b>	<b>AUTHOR</b>	<b>TITLE OF THE BOOK</b>	<b>PUBLISHERS / EDITION</b>	<b>YEAR OF PUBLICATION</b>
1.	Bob Hughes, Mike Cotterell , Rajib Mall	Software Project Management	Tata McGraw Hill, Fifth Edition	2012

**Web References**

1. <http://sigc.edu/department/mca/studymet/SoftwareProjectManagment.pdf>
2. [http://www.pypsiddhartha.ac.in/dep\\_it/lecture%20notes/SPM/unit4.pdf](http://www.pypsiddhartha.ac.in/dep_it/lecture%20notes/SPM/unit4.pdf)
3. [http://www.pypsiddhartha.ac.in/dep\\_it/lecture%20notes/SPM/unit5.pdf](http://www.pypsiddhartha.ac.in/dep_it/lecture%20notes/SPM/unit5.pdf)
4. <https://www.tutorialride.com/software-engineering/risk-management-in-software-engineering.htm>

**Course Outcomes**

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Discuss software development project plans	K2
CO2	Apply schedule and cost techniques to determine a basis of estimate	K3
CO3	Differentiate software life cycle support and the role of the software engineering supervisor	K4
CO4	Formulate software project management practices within an organization and recommend practical improvements based upon evaluation.	K5

**Mapping with Programme Outcomes**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>

**S**– Strong; **M**–Medium; **L** – Low

**Pedagogy**

Chalk and talk, Lecture, Discussion, Quiz, Demonstration,PPT

**Course Designer**

Mrs.N.Agalya

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3CC7	COMPUTER SCIENCE FOR COMPETITIVE EXAMINATIONS	CORE	90	6	-	5

### Objective

- To understand the need for preparing competitive exams
- To study the basic concepts of core subjects in computer science
- To inculcate the knowledge of implementation of various concepts

### Syllabus

#### UNIT I

(18 HOURS)

**Mathematical Logic:** Propositional and Predicate Logic - Normal Forms- Predicates and Quantifiers-Rules of Inference-Sets and Relations: Probability - Group Theory –Graph Theory – Optimization-**Digital Logic:** Number systems- Boolean Algebra and Minimization of functions- Combinational Circuits – Sequential Circuits.

#### UNIT II

(18 HOURS)

**Computer Organization and Architecture:** Machine Instruction and Addressing Modes – ALU & Data Path, CPU Control Design – Memory & I/O Interface – Instruction Pipeline – Cache and Main Memory, Secondary Storage – Microprocessor-Computer Graphics: **2-D Geometrical Transforms and Viewing- 3-D Object Representation, Geometric Transformations and Viewing- Software Engineering:** Software Process Models – Software Requirements – Software Design – Software Quality – Estimation and Scheduling of software projects – Software Testing – Software Configuration Management.

#### UNIT III

(18 HOURS)

**Database Management Systems:** Basic concepts – Data Modeling – SQL – Normalization-Data models – Data Warehousing and Data Mining-**Operating System :** Basics of operating system - Process Management – Threads – CPU Scheduling – Deadlocks – Memory Management – Storage Management – File and Input/output Systems – Security – Linux – Distributed Systems-**Data Structures and Algorithms:** Linked Lists, Stacks and Queues – Trees-Searching - Sorting – Hashing - Asymptotic Analysis – Algorithm design techniques: Greedy Approach, Dynamic Programming Divide and Conquer – Graph Search, Minimum Spanning trees, Shortest paths – Complexity Theory .

#### UNIT IV

(18 HOURS)

**Theory of Computation:** Finite Automata and Regular Languages–Context Free Languages and Push down Automata–Recursive Enumerable sets and Turing Machines – Syntax & Semantic Analysis-**Compiler Design:** Lexical Analysis and Parsing – Syntax Directed Translation-Intermediate code generation – Code optimization-**Data Communication and Computer Networks:** Concept of Layering – Network Types & Models – Functions of OSI & TCP/IP Layers - Flow and Error Control techniques, switching – IPV4/IPV6, routers and routing algorithms – TCP/UDP and sockets, congestion controls. Application Layer Protocols (WWW, DNS, SMTP, POP, FTP, and HTTP) -Network Security: authentication, basics of public key, cryptography, digital signatures and certificates, firewalls.

#### UNIT V

(18 HOURS)

Number Systems- Series Completion -Coding & Decoding- Problems on Ages - Blood Relation - Probability – Permutation & Combination - Data Interpretation - ICT (Information and Communications Technology-Logical Reasoning & Non – Verbal Reasoning .  
Case Study: **Programming Languages-** Programming in C- Object Oriented Programming – Programming in C++/JAVA - Web Programming.

**Reference Books**

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1.	Dr.R.S.Aggarwal,	Quantitative Aptitude for Competitive Examinations	S.Chand Publishing	2017
2.	Dr.R.S.Aggarwal,	A modern Approach to verbal & Non-verbal Reasoning	S.Chand Publishing	2020
3.	R.Gupta	UGC – NET/SET Computer Science & Applications	R.Gupta	2015
4.	Surbhi Sharma,Kailasah Chandra Gurunani	UGC NET Computer Science and Applications	Arihant Publication	2018
5.	Trishna Knowledge Systems	GATE Computer Science and Information Technology-GATE 2020	Pearson	2019

**Web References**

1. <https://www.careerbless.com/aptitude/qa/home.php>
2. <https://www.sawaal.com/aptitude-reasoning/quantitative-aptitude-arithmetic-ability-questions-and-answers.html>
3. <https://www.indiabix.com/non-verbal-reasoning/questions-and-answers/>
4. <https://www.geeksforgeeks.org/ugc-net-cs-preparation/>
5. <http://www.netugc.com/ugc-net-solved-question-papers-in-computer-science-and-applications>
6. <https://gatecse.in/>
7. <https://gateoverflow.in/>

**Course Outcomes**

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

CO Number	CO Statement	Knowledge Level
CO1	Explain concepts of computer science core subjects	K2
CO2	Apply the knowledge to solve various types of problems	K3
CO3	Examine various computer science concepts on real time applications	K4
CO4	Develop a scientific aptitude and sense of reasoning	K5

**Mapping with Programme Outcomes**

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

S – Strong; M – Medium; L - Low

**Pedagogy**

Chalk and Talk, PPT, Discussion, Group discussion, Assignments, Workshops

**Course Designer** Ms.R.Ramya



Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3CC8	BIG DATA ANALYTICS	CORE	90	6	-	5

### Objective

- To provide knowledge about Big data Analytics
- To study the basic concepts on Data Science & Analytical Technologies
- To understand about Hadoop & MAPREDUCE fundamentals
- To inculcate knowledge about MongoDB & Cassandra

### Syllabus

#### Unit I

(12 HOURS)

Types of Digital Data: Classification of Digital Data - Characteristics of Data-Evolution of Big Data-Definition of Big Data-Challenges with Big Data- Characteristics of Big Data-Other characteristics of data - Need for Big Data.

#### Unit II

(18 HOURS)

Big Data Analytics: Characteristics of Big Data analytics- Need for Big Data analytics-Classification of analytics-Greatest challenges that prevent businesses from capitalizing on Big Data –Importance of Big Data analytics – Data science-Data scientist- Terminologies used in Big Data environments-Analytics tools.

#### Unit III

(20 HOURS)

Big data Technology: NoSQL - Hadoop. Introduction to Hadoop: Introducing Hadoop- Need for Hadoop-Limitations of RDBMS -RDBMS versus HADOOP-History of Hadoop – Hadoop overview-Interacting with Hadoop ecosystem –HDFS - Processing Data with Hadoop MapReduce – Managing resources and applications with Hadoop YARN-Introduction to MAPREDUCE programming.

#### Unit IV

(20 HOURS)

Introduction to MongoDB: Need for MongoDB -Terms used in RDBMS and MongoDB - Data types in MongoDB- MongoDB Query Language.

#### Unit V

(20 HOURS)

Introduction to Cassandra: An introduction -Features of Cassandra-CQL data types-CQLSH-Keyspaces-CRUD- Collections -Using a Counter – Time to live – Alter commands – Import and Export

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1.	Seema Acharya, Subhashini Chellappan	Bigdata and Analytics	Wiley India Pvt.Ltd	2015

## Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1.	V.Bhuvanewari T.Devi	Bigdata Analytics- A Practioner's Approach	harathiyar University, Coimbatore	2016
2.	Michael Minelli, Michele Chambers, Ambiga Dhiraj	Big data Big Analytics	Wiley	2013
3.	Bart Baesens	Analytics in a Big data World	Wiley	2014
4.	DT Editorial Services	Big data Black Book	Dreamtech Press	2016

## Web References

1. [https://webopedia.com/TERM/B/big\\_data\\_analytics.html](https://webopedia.com/TERM/B/big_data_analytics.html)
2. <https://hadoop.apache.org/>
3. <https://www.mongodb.com/>
4. <https://www.tutorialspoint.com/cassandra/index.htm>
5. <https://www.edureka.co/blog/mapreduce-tutorial/>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of Bigdata analytics	K2
CO2	Describe the Hadoop architecture and File system	K2
CO3	Apply the MapReduce Programming model for real-world problems	K3
CO4	Explore the concepts of NoSQL databases	K4
CO5	Develop a complete business data analytics solution	K6

## Mapping with Programme Outcomes

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

S – Strong; M – Medium; L - Low

## Pedagogy

Chalk and talk, PPT, Discussion, Interactive Teaching, Group discussion and Workshops

**Course Designer** Ms.A.Sahaya Jenitha

Semester III	Internal Marks : 40			External Marks:60		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3CC3P	PYTHON AND R LAB	CORE	90	6	-	4

### Objective

- To write ,test and debug simple Python programs
- To implement Python programs with list, tuples and dictionary
- To analyze the data using R

### PYTHON PROGRAMMING

1. Create a calculator program
2. Demonstrate use of Loops
3. Demonstrate use of List
4. Demonstrate use of Tuples
5. Demonstrate use of Dictionaries
6. Explore string functions
7. Demonstrate usage of basic regular expression
8. Read and write a file
9. Demonstrate Exceptional Handling Technique
10. Create Comma Separate Files (CSV), Load CSV files into internal Data Structure

### R PROGRAMMING

1. Demonstrate use of Data frames
2. Explore functions
3. Exporting data into CSV,Excel,SAS & STATA
4. Correlation with Matrix Example
5. Data Visualization
6. Demonstrate machine Learning algorithm
  - i. Decision Tree
  - ii. K-Means

### Web References

- 1.<https://www.programiz.com>
- 2.[https:// www.statmethods.net](https://www.statmethods.net)
3. <https://www.datamentor.io/>

**Course Outcomes**

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Write and debug simple Python programs with loops and conditions	K3
CO2	Use Python lists, tuples, dictionaries for representing compound data and apply file concept in Python	K4
CO3	Construct Python programs step-wise by defining functions and calling them	K5
CO4	Create a dataframe and exporting data into various file formats in R.	K5
CO5	Apply Machine Learning algorithm in R	K3

**Mapping with Programme Outcomes**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>

**S – Strong; M – Medium; L – Low**

**Pedagogy**

Demonstration

**Course Designer**

Ms.K.Reka

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3EC3A	BLOCKCHAIN	ELECTIVE	90	6	-	4

### Objective

- Allow the students to explore the driving force behind the cryptocurrency
- Inculcate knowledge about Bitcoin, along with the Decentralization and Cryptography provides alternative to Bitcoins
- Initiate Smart contracts and currencies

### Syllabus

#### UNIT I

(13 HOURS)

Distributed systems- History of blockchain- Introduction to blockchain- Types of Blockchain - CAP theorem and blockchain- Benefits and limitations of blockchain.

#### UNIT II

(17 HOURS)

Decentralization using blockchain- Methods of decentralization- Routes to Decentralization- Decentralized organizations-Cryptography and Technical Foundations: Cryptographic primitives- Asymmetric cryptography- Public and private keys.

#### UNIT III

(20 HOURS)

Bitcoin –Transactions- Blockchain- Bitcoin payments. Alternative Coins -Theoretical foundations- Bitcoin limitations- Namecoin, Litecoin, Primecoin, Zcash.

#### UNIT IV

(20HOURS)

Definition-Ricardian contracts: Smart contract templates-Deploying smart contracts on ablockchain.

#### UNIT V

(20 HOURS)

Internet of Things- Government- Health- Finance- Media.

### Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Imran Bashir	Mastering Blockchain	Packt, Birmingham, Mumbai	2018
2.	Andreas M.Antonopoulos	Mastering Bitcoin	O'REILLY,2 <sup>nd</sup> Edition	2019

### Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	Tiana Laurence	Blockchain for dummies	Wiley	2017

## Web References

1. <http://nptel.ac.in/courses/106106168/27>
2. <https://www.edx.org/learn/blockchain-cryptography>
3. <https://www.class-central.com/tag/blockchain>
4. <https://cognitiveclass.ai/courses/blockchain-course/>
5. <https://www.skillshare.com/browse/blockchain>

## Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Define blockchain, types, applications & limitations	K1
CO2	Explore blockchain, cryptography concepts	K2
CO3	Enumerate bitcoin and other alternatives	K3
CO4	Differentiate various contracts	K4
CO5	Propose IoT in various sectors	K5

## Mapping with Programme Outcomes

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

S – Strong; M – Medium; L – Low

## Pedagogy

Chalk and Talk, Discussion, Lecture, Quiz, PPT

## Course Designer

Ms.D.Radhika

<b>Semester III</b>	<b>Internal Marks : 25</b>			<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDITS</b>
<b>19PCS3EC3B</b>	<b>PARALLEL PROCESSING</b>	<b>ELECTIVE</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>4</b>

### **Objective**

- To study how parallel computers work
- To analyze the correct designs of parallel architectures, especially within the technological constraints
- To prepare students for a career in designing the computer systems of the future

### **Syllabus**

#### **UNIT I (16 HOURS)**

Fundamentals of Parallel Processing – Evolution of Computer System- Trends towards parallel processing – Parallelism in Uniprocessor Systems – Parallel Computer Structures – Architectural Classification Schemes– Parallel Processing Applications.

#### **UNIT II (16 HOURS)**

Memory and Input-Output Subsystems: Hierarchical Memory Structure – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

#### **UNIT III (20 HOURS)**

Pipelining : An Overlapped Parallelism – Principles linear pipelining – classification of pipeline processors – general pipeline and reservation tables – arithmetic pipeline design examples – data buffering and bus Structure – internal forwarding and register tagging – hazard detection and resolution – job Sequencing and collision prevention – vector processing requirements – characteristics – Pipelined vector processing methods.

#### **UNIT IV (20 HOURS)**

Vectorization and Optimization Method- Language Features in Vector Processing – Design of Vectorizing Compilers-SIMD array processors – Organization – Masking and Data routing – Inter PE Communications – SIMD Interconnection Networks – Static vs Dynamic network– Mesh connected Illiac network– Cube Interconnection network – Barrel Shifter and Data Manipulator - Shuffle-exchange and Omega networks- GPU Basics-Architecture of a modern GPU-Evolution of Graphics Pipelines-GPGPU-An intermediate Step-GPU computing.

#### **UNIT V (18 HOURS)**

Multiprocessors Architecture and Programming - Functional Structures - Interconnection Networks – Time Shared or Common Buses- Crossbar Switch and Multiport Memories- Multistage Networks for Multiprocessors- Parallel Memory Organizations - Multiprocessor Operating Systems –Multiprocessor Scheduling Strategies.

### **Text Book**

<b>S.NO</b>	<b>AUTHOR</b>	<b>TITLE OF THE BOOK</b>	<b>PUBLISHER/ EDITION</b>	<b>YEAR OF PUBLICATION</b>
1.	Kai Hwang, Faye A. Briggs	Computer Architecture and Parallel Processing	McGraw Hill International Edition	2017

## Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1.	Sajjan G. Shiva	Advanced Computer Architecture	Taylor & Francis	2006
2.	Kai Hwang	Advanced Computer Architectures : Parallelism, Scalability, Programmability	Tata McGraw Hill	2003
3.	David B.Kirk, Wen-mei W.Hwu	Programming Massively Parallel Processors	MK Publications, Second Edition	2013

## Web References

1. [https://www.tutorialspoint.com/parallel\\_computer\\_architecture/index.htm](https://www.tutorialspoint.com/parallel_computer_architecture/index.htm)
2. <https://www.geeksforgeeks.org/introduction-to-parallel-computing/>
3. <https://www.studytonight.com/computer-architecture/parallel-processing-and-data-transfer>
4. <https://www.nlb.gov.sg/biblio/12672553>
5. [https://vincyjoseph.files.wordpress.com/2014/01/computer\\_architecture\\_hwang\\_brigg.pdf](https://vincyjoseph.files.wordpress.com/2014/01/computer_architecture_hwang_brigg.pdf)
6. <http://digilib.stmikbanjarbaru.ac.id/data.bc/18.%20Programming/2013%20Programming%20Massively%20Parallel%20Processors%20A%20Hands-on%20Approach%202nd.pdf>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Discuss the concepts of parallel processing including various kinds of system architectures	K2
CO2	Illustrate the issues and techniques in improving performance of SIMD Computers	K3
CO3	Compare the pipeline and parallel concepts	K4
CO4	Categorize the Multiprocessor systems, cache coherence and Interconnection networks	K5

## Mapping with Programme Outcomes

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

S – Strong; M – Medium; L - Low

## Pedagogy

Chalk and talk, Lecture, Discussion, Quiz, Demonstration, PPT

## Course Designer

Mrs.R.Ramya



Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3EC3C	COMPILER DESIGN	ELECTIVE	90	6	-	4

### Objective

- To enrich the knowledge in various phases of compiler and its uses
- Learn code optimization techniques, machine code generation and use of symbol table
- To identify the similarities and differences among various parsing techniques and grammar transformation techniques

### Syllabus

#### UNIT I (18 HOURS)

Introduction to Compiler– Phases of a Compiler – Cousins of Compiler- Lexical analysis: Role of a lexical analyzer – Input buffering –Specification of tokens – Finite Automata: Nondeterministic Finite Automata-Deterministic Finite Automata- Conversion of NFA to DFA- Constructing NFA from Regular Expression.

#### UNIT II (18 HOURS)

Syntax Analysis: Role of parser-Context Free Grammar-Regular Expression Vs. Context Free Grammar-Elimination of Left Recursion-Left Factoring- Top down parsing – Simple bottom up parsing – Shift reducing parsing.

#### UNIT III (20 HOURS)

LR Parsers - LR parsing algorithms-Constructing SLR parsing tables-Constructing Canonical LR parsing tables-Constructing LALR parsing table-Parser Generator-YACC.

#### UNIT IV (18 HOURS)

Run-time environment - Source language issues – Storage organizations – Storage allocation strategies –Parameter Passing- Intermediate code generation: Intermediate languages – Declarations – Assignment statements- Backpatching

#### UNIT V (16 HOURS)

Code generation - Issue in design of code generator – The target machine – Runtime storage management – Basic blocks and flow graphs – DAG representation of Basic Blocks- Code optimization: Introduction – Principle source of code optimization – Optimization of basic blocks- Peephole Optimization

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1	Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman,Monica S.Lam	Compilers Principles, Techniques and Tools	Pearson Education, 6 <sup>th</sup> Edition	2007

## References Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/ EDITION	YEAR OF PUBLICATION
1	Parag H. Dave, Himanshu B. Dave	Compilers: Principles and Practice	Pearson	2012
2	Raghavan V	Principles of Compiler Design	Tata Mc-Graw Hill Education Pvt. Ltd	2017

## Web References

1. [https://www.slideshare.net/appasami/cs6660-compiler-design-notes?next\\_slideshow=1](https://www.slideshare.net/appasami/cs6660-compiler-design-notes?next_slideshow=1)
2. [https://www.slideshare.net/mir\\_majid\\_kant/lec00-outline](https://www.slideshare.net/mir_majid_kant/lec00-outline)
3. <https://www.ssmengg.edu.in/weos/weos/upload/EStudyMaterial/Cse/6th%20sem/compiler%20design/compiler%20design.pdf>
4. [http://www.engppt.com/2009/08/compiler-design-ppt\\_21.html](http://www.engppt.com/2009/08/compiler-design-ppt_21.html)
5. <https://www.slideshare.net/fellowbuddy/compiler-design-lecture-notes>
6. <https://www.slideshare.net/eelcovisser/lr-parsing-71059803>
7. <http://www.d.umn.edu/~rmaclin/cs5641/Notes/Lecture9.ppt>
8. <https://www.cse.iitm.ac.in/~krishna/cs3300/lecture2.pdf>

## Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Construct grammars and automata for regular language	K3
CO2	Analyze the knowledge of patterns, tokens & regular expressions for solving a problem	K4
CO3	Develop new code optimization techniques for improving the performance of a program in terms of speed & space	K5
CO4	Predict symbol table and generate intermediate code	K6

## Mapping with Programme Outcomes

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

S – Strong; M – Medium; L - Low

## Pedagogy

Chalk and Talk , PPT , Discussion, Assignment, Demonstration, Quiz, Case study

Course Designer Dr.P.Rajeswari

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3EC4A	ROBOTIC PROCESS AUTOMATION	ELECTIVE	90	6	-	4

### Objective

- To enrich the knowledge in Robotic Process Automation
- Learn sequence and control flow
- To know about the RPA Usecases

### Syllabus

**UNIT I (15 HOURS)**  
**What is Robotics Process Automation:** Scope and Techniques of Automation - Robotic Process Automation – The Future of Automation.

**UNIT II (20 HOURS)**  
**Sequence, Flow Chart and Control Flow:** Sequencing the Workflow – Activities – Control Flow, Various Types of Loops and Decision Making, Step-by-step example using Sequence and Flow Chart - Step-by-step example using Sequence and Control Flow.

**UNIT III (20 HOURS)**  
**Data Manipulation:** Variables and Scope – Collections – Arguments – Purpose and use – Data Table usage with examples – Clipboard Management – File Operation with step-by-step example – CSV/Excel to data table and vice versa.

**UNIT IV (20 HOURS)**  
**Taking Control of The Controls System:** Finding and Attaching Windows – Finding the Control – Techniques for waiting for a control – Act on Controls – Mouse and Keyboard Activities – Working with UiExplorer – Handling events – Revisit Recorder – Screen Scraping – When to use OCR – Types of OCR available – How to use OCR – Avoiding Typical failure points.

**UNIT V (15 HOURS)**  
**RPA Usecases:** RPA in Banking – Excel Automation – PDF Data Extraction & Automation – RPA Data Migration and Entry – Email Automation

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1.	Alok Mani Tripathi	Learning Robotic Process Automation	Packt, Birmingham	2018

### Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1	Steve Kaelble	Robotic Process Automation for dummies	NICE RPA team	2018

## Web References

- 1.<https://www.edureka.co/blog/rpa-tutorial/>
- 2.<https://www.udemy.com/course/robotic-process-automation/>
- 3.<https://www.guru99.com/robotic-process-automation-tutorial.html>
- 4.<https://www.automationanywhere.com/in/robotic-process-automation>
- 5.<https://www.uipath.com/blog/learning-robotic-process-automation-through-video-tutorials>

## Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Learn Robotic Process Automation and its Features	K1
CO2	Explore Control Flow and Decision Making	K2
CO3	Enumerate Clipboard Management	K3
CO4	Differentiate various controls	K4

## Mapping with Programme Outcomes

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

S – Strong; M – Medium; L - Low

## Pedagogy

Chalk and Talk, Discussion, Lecture, Quiz, PPT

## Course Designer

Ms.R.Sangeetha

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
19PCS3EC4B	MACHINE LEARNING	ELECTIVE	90	6	-	4

### Objective

- Introduce and define the meaning of Machine Learning
- Explore various paradigms for knowledge encoding in computer systems.
- Also introduce the concept of learning patterns from data and develop a strong theoretical foundation for understanding state of the art Machine Learning algorithms.

### Syllabus

#### UNIT I (15 HOURS)

Introduction to machine learning- What is machine learning – Classification, Supervised/Unsupervised Learning, Probably Approximately Correct(PAC) Learning.

#### UNIT II (15 HOURS)

Bayesian Decision Theory:Classification, Losses and Risks, Discriminant Functions, Utility Theory- Evaluating an Estimator: Bias and Variance- The Bayes' Estimator Parametric Classification-Model Selection Procedures.

#### UNIT III (20 HOURS)

Multivariable Methods :Multivariate Data – Parameter Estimation – Estimation of Missing Value – Multivariate Normal Distribution – Multivariate Regression – Dimensionality Reduction – Factor Analysis – Multidimensional Scaling – Locally Linear Embedding.

#### UNIT IV (20 HOURS)

Clustering:K-Means Clustering – Mixtures of Latent Variable Models – Hierarchical Clustering – Nonparametric Methods Nonparametric Density Estimation – K-Nearest Neighbor Estimator – Nonparametric Classification – Smoothing Models.

#### UNIT V (20 HOURS)

Decision Trees:Univariate Trees – Pruning – Rule Extraction from Trees – Multivariate Trees – Linear Discrimination: Generalizing the Linear Model – Logistic Discrimination – Discrimination by Regression.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1.	Ethem Alpaydin	Introduction to Machine Learning	MIT Press, Third Edition	2014

### Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1.	Tom M. Mitchell	Machine Learning	McGraw Hill Education(India) Private Limited	2013
2.	Peter Norvig Stuart Russell	Artificial Intelligence AModern Approach	Pearson, Third Edition	2015

## Web References

- 1.<https://expertsystem.com/machine-learning-definition/>
- 2.<https://www.geeksforgeeks.org/machine-learning/>
- 3.<https://www.edureka.co/blog/what-is-machine-learning/>
- 4.<https://towardsdatascience.com/the-5-clustering-algorithms-data-scientists-need-to-know-a36d136ef68>

## Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Describe the theory underlying machine learning	K1
CO2	Classify knowledge about Modeling and prediction and basic feature engineering	K2
CO3	Use linear models and non-linear models	K3
CO4	Make inferences on algorithm using tree, rule based models and analyze reinforcement learning techniques	K4
CO5	Construct algorithms using Python and R	K5

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	M	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 , Discussion, Assignment, Demo, Quiz, Case study

## Course Designer

Ms.V.Kavitha

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
19PCS3EC4C	IoT	ELECTIVE	90	6	-	4

### Objective

- To understand the technology behind Internet of Things
- To get familiar with the design principles of connected devices
- To know about IoT platforms and design methodologies

### Syllabus

#### UNIT I (15 HOURS)

Introduction to IoT: Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates – Domain Specific IoTs: Home Automation – Cities – Environment –Energy – Logistics – Retail – Agriculture.

#### UNIT II (20 HOURS)

IoT and M2M: Introduction – M2M – Different between IoT and M2M – SDN and NFV for IoT– IoT System Management with NETCONF- YANG: Simple Network Management Protocol (SNMP)- Networkoperator Requirement – NETCONF – YANG- NETOPEER – Developing IoT: IoT platforms design methodology – IoT Design Methodology – Motivation for using Python.

#### UNIT III (20 HOURS)

IoT Systems – Logical Design using python: Introduction – Installing Python – python Data Types & Data Structures – Control Flow – Functions – Modules – Packages-File handling-date/Time Operations-classes-Python Packages of interest for IoT – IoT physical Devices and Endpoints : What is an IoT Device – Exemplary Devices - Raspberry pi Interfaces – Programming Raspberry pi with Python – other IoT Devices.

#### UNIT IV (15 HOURS)

Data Analytics for IOT: Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Spark – Apache Storm- Using Apache Storm for Real-time Data Analysis.

#### UNIT V (20 HOURS)

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs – WAMP – AutoBahn for IoT – Amazon Web Services for IoT - Tools for IoT: Puppet – Case Study on IoT System for Weather Monitoring.

### Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER /EDITION	YEAR OF PUBLICATION
1	Arshdeep Bahga, Vijay Madisetti	Internet of Things A Hands on Approach	University press	2014

## Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER/EDITION	YEAR OF PUBLICATION
1.	David Hanes, Gonzalo Salgueiro, Patrick Grossette, Robert Barton, Jerome Henry	IoT Fundamentals, Networking Technologies, Protocols and Use cases for Internet of Things	Cisco Press	2017
2.	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things – Key applications and Protocols	Wiley	2012
3.	Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle	From Machine to Machine to the Internet of Things – Introduction to a new age of Intelligence	Elsevier	2014

## Web References

1. <https://github.com/connectiot/iottoolkit>
2. <https://www.arduino.cc/>
3. <https://www.tutorialspoint.com/>
4. <https://www.guru99.com/>
5. <https://www.pythonforbeginners.com/>

## Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Illustrate IoT enabling Technologies	K3
CO2	Analyze applications of IoT in real time scenario	K4
CO3	Design a portable IoT using Raspberry pi / equivalent boards and relevant protocols	K5

## Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	S	S
CO2	S	S	S	S
CO3	S	S	S	S

S – Strong; M – Medium; L – Low

## Pedagogy

Chalk and Talk , PPT , Discussion, Assignment, Demo, Quiz, Case study

## Course Designer

Ms P.Muthulakshmi



## EXTRA CREDIT COURSE

Semester III	Internal Marks : 25			External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDITS
	Introduction to Research	Extra Credit Course	8 Weeks	-	-	2

### Course Outline

- This course aims to introduce students to the important aspects of research.
- The intent of the course is to make students aware of the details associated with formal research and to help students overcome common misconceptions that may be present in their minds
- By going through this course, students are likely to be able to take up research activities in a more systematic and formal manner right from the beginning

### Course Plan

Week 1: A group discussion on what is research; Overview of research;

Week 2: Literature survey , Experimental skills;

Week 3: Data analysis, Modelling skills;

Week 4: Technical writing; Technical Presentations; Creativity in Research

Week 5: Creativity in Research; Group discussion on Ethics in Research

Week 6: Design of Experiments

Week 7: Intellectual Property

Week 8: Department specific research discussions

### Course Instructor



Prof. Prathap Haridoss is a Professor in the Department of Metallurgical and Materials Engineering at IIT Madras. He works in the areas of Fuel Cell and Carbon nanomaterials. He has a B.Tech in Metallurgical Engineering from IIT Madras, and a PhD in Materials Science and Engineering from the University of Wisconsin-Madison, USA. Before he joined as a faculty at IIT Madras, he served as a Senior Scientist at Plug Power, a Fuel Cell company in New York. He has 3 US patents, several International Journal publications, and has published a book titled “Physics of Materials, Essential Concepts of Solid State Physics”