

GOVERNMENT ARTS COLLEGE (AUTONOMOUS) SALEM-7

M.Sc. Computer Science

SYLLABUS

(Effective from the Academic Year 2021-2022)

Department of Computer Science

Vision

To provide an outstanding student experience, underpinned by high quality teaching and learning, resulting in career choices in the IT industry that extend beyond programming / software development and into latest fields like data science, data analytics.

Mission

- To provide effective learning ambiance to gain an excellent skill set to pursue a wide range of careers in the changing and challenging technological world.
- To obtain wide-reaching technical skills and knowledge of latest technologies.
- To facilitate burgeoning researchers in the emerging areas of the discipline.

Programme Educational Objectives (PEOs)

- To develop and implement solution based systems and / or processes that address issues in improving existing systems in computing industries.
- To exhibit the computing expertise within the computing community through corporate leadership, entrepreneurship, and / or advanced graduate study.
- To enable students to recognize the professional, legal, social, and ethical issues associated with the exploitation of Web and Internet based Computing and ICT.

Graduate Attributes (GA)

1. **Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
2. **Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
3. **Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally, demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
4. **Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.

5. **Leadership readiness/qualities:** Capability for mapping out the tasks of a team, formulating an inspiring vision, building a team who can help achieve the vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
6. **Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
7. **Analytical reasoning :** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; **Scientific reasoning:** Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
8. **Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life; avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues.
9. **Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
10. **Self-directed learning:** Ability to work independently; identify appropriate resources required for a project, and manage a project through to completion.

Programme Specific Outcomes (PSOs)

On the successful completion of the programme, students will be able to

PSOs Number	PSOs Statement
PSO1	Demonstrate broad knowledge in core areas of computer science, current and emerging technologies in IT.
PSO2	Implement and analyze algorithms and paradigms with modern software tools.
PSO3	Understand the fundamentals of computing systems, design and functionality of the hardware components and their underlying execution.
PSO4	Develop and implement data analysis strategies based on theoretical principles, and detailed knowledge of the underlying data.
PSO5	Learn and use new development tools, software framework, middleware, programming language or methodology to aid in the development of software projects.

PSO6	Understand the concepts of Network Security, Mobile Communication, Machine Learning and Cyber Security and pursue research in the interested domains.
PSO7	Apply knowledge of basic sciences, mathematics and statistics to computer science and solve problems.
PSO8	Get industrial exposure through the 6 months Industrial Internship in IT industry.
PSO9	Understand and respond towards research areas of computer science and the need for lifelong learning.
PSO10	Function effectively on multi-disciplinary projects and problems.

Course Structure for M.Sc. Computer Science Programme - 2021 - 2022

S.No.	Category	No. of Courses	Total Credits	Marks
1.	Core Theory Courses	12	60	1200
2.	Core Practical Courses	05	15	500
3.	Major Based Elective Courses	02	08	200
4.	Research Acumen Courses	03	--	300
5.	Interdisciplinary Course	01	02	100
6.	Mini Project	01	03	100
7.	Project Work	01	12	200
	TOTAL	25	100	2600

Total No. of Courses : 25

MOOC/SWAYAM/NPTEL : 1

No. of New Courses Introduced : 9

No. of Courses Modified : 5

Percentage of Courses as per TANSCHE Norms : 76 %

Head of the Department

Principal

GOVERNMENTARTSCOLLEGE(AUTONOMOUS), SALEM - 7
M.Sc. Computer Science

For the candidates admitted from the Academic Year 2021-2022

S. No	Course Code	Title of the Course	Hours to be handled	Credits	Marks		
SEMESTER I							
1	21PCS01	Core Course – I : Mathematical Foundations for Computer Science - I	5	5	25	75	100
2	21PCS02	Core Course – II : Design and Analysis of Algorithms	5	5	25	75	100
3	21PCS03	Core Course – III: Dot Net programming	5	5	25	75	100
4	21PCS04	Core Course – IV: Distributed Operating Systems	5	5	25	75	100
5	21PCSP1	Core Practical I: Algorithm Lab	2	3	40	60	100
6	21PCSP2	Core Practical - II: Dot Net - Lab	2	3	40	60	100
7	21PCSM1	Major Based Elective Course-I: Cyber Security	4	4	25	75	100
	21PCSM2	Major Based Elective Course-II: Software Project Management					
8	21RAC01	Research Acumen Course I: Intellectual Property Rights	2	*	--	100	100
Total Credits and Marks			30	30			800
SEMESTER II							
1	21PCS05	Core Course – V : Mathematical Foundations for Computer Science - II	5	5	25	75	100
2	21PCS06	Core Course – VI : Data Science	5	5	25	75	100
3	21PCS07	Core Course – VII: Advanced Web Technology	5	5	25	75	100
4	21PCS08	Core Course – VIII : Advanced Data Base Management Systems	5	5	25	75	100
5	21PCSP3	Core Practical - III :Data Analysis using R	2	3	40	60	100
6	21PCSP4	Core Practical - IV: Advanced Web Technology Lab	2	3	40	60	100
7	21PCSM3	Major Based Elective Course-III: Cloud Computing	4	4	25	75	100
	21PCSM4	Major Based Elective Course-IV: Social Network Analysis					
8	21RAC02	Research Acumen Course II: Research Writing	2	*	--	100	100
Total Credits and Marks			30	30			800
CUM-TOTAL				60			1600

S. No.	Course Code	Title of the Course	Hours to be handled	Credits	Marks		
					I.A.	S.E.	Max
SEMESTER III							
1	21PCS09	Core Course IX: Cryptography and Network Security	6	5	25	75	100
2	21PCS10	Core Course -X : Advanced Java Programming	6	5	25	75	100
3	21PCS11	Core Course - XI : Internet of Things	6	5	25	75	100
4	21PCS12	Core Course - XII : Machine Learning	6	5	25	75	100
5	21PCSP5	Core Practical - V : Advanced Java - Lab	2	3	40	60	100
6	21PCSP6	Mini Project	2	3	40	60	100
7	21PBYCS	Interdisciplinary Course : Bioinformatics	2	2	25	75	100
Total Credits and Marks				30	28		700
CUM-TOTAL					88		2300
SEMESTER IV							
1	21PCSPR	Project Work	6	12	50	150	200
2	21RAC03	Research Acumen Course III : Research and Publication Ethics	2	*	--	100	100
Total Credits and Marks				8	12		300
Grand Total of Credits and Marks					100		2600

* Self Study course

Note : Student has to select one PG Course relevant to his/her subject offered through SWAYAM/NPTEL platform is mandatory and he/she must obtain 40% marks in Internal assessment. Besides, a student who wishes to get course completion certificate must necessarily enroll and pass in the examination conducted through SWAYAM/NPTEL platform. The enrollment process has to be authenticated by the Head of the Department.

SEMESTER - I												
Course Code	21PCS01	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE -I	L	T	P	C						
Core/Elective/Supportive		CORE COURSE -I	5	0	0	5						
Pre-requisite	Knowledge on Mathematics and Statistics			Academic Year 2021-2022								
COURSE OBJECTIVES:												
<ul style="list-style-type: none"> To understand the concepts and operations of matrix algebra needed for computing graphics modeling and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science. To Collecting and analyzing a sample investigation are to reveal characteristics of a population. 												
SYLLABUS												
Unit : I	12 hours											
Introduction: Statements and Notations- Connectives: Negation- Conjunction-Disjunction-Statement Formulas and Truth Tables-Conditional and Bi-Conditional-Well Formed Formulas-Tautologies-Equivalence of Formula-Duality law-Tautological Implications. Normal Forms: Disjunctive Normal Forms-Conjunctive Normal Forms-Principal Disjunctive Normal Forms- Principal Conjunctive Normal Forms. Chapter :1 Section :1.1-1-2.4, 1-2.6-1-2.11 , 1-3-1-3.4												
Unit : II	12 hours											
Theory of inference for the Statement Calculus-The Predicate Calculus: The Statement, function, variables and quantifiers-Predicate formulas-Free and Bound Variables-The Universe of discourse. Inference Theory of the Predicate Calculus: Valid Formulas and equivalences-Some valid formula involving quantifiers- Theory of inference for the Predicate calculus-Formulas involving more than one quantifiers. Chapter:1 Section:1-4-1-6.5												
Unit : III	12 hours											
Relations and Functions: Relations and ordering - Properties and Binary relations in a Set - Relation Matrix and Graph of a relation - Partition and covering of a set -Equivalence Relations - Compatibility relations - Composition of Binary Relations -Functions. Definition and Introduction - Composition of function - Inverse functions -Binary and n-ary operations - Hashing functions - Natural numbers - Recursion. Chapter:2 Section:2-3-2-3.7 , 2-4-2-4.4, 2-4.6. 2-5,2-6												
Unit : IV	12 hours											
Large sample test: Test of single proportion – difference of proportion. Test of significance of single mean - Difference of mean. Test of significance of difference of Standard Deviation. Chapter:12 :12.1,12.2,12.9,12.12-12.15.												
Unit : V	12 hours											
Small sample test: Chi-square test of goodness of fit-independent attributes .T-test for single mean - difference of mean. F - test for equality of population variances. Chapter:13 :13.7.1-13.7.3 Chapter:14 :14.1,14.2.1,14.2.9-14.2.10,14.5.5												
Total Lecture hours						60 hours						

TEXT BOOKS	
1	Trembly J.P. and Manohar R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publications Co. Ltd., New Delhi 2003.
2	S.C. Gupta and VK Kapoor, "Fundamentals of Mathematical Statistics", 10th revised edition.
REFERENCE BOOKS	
1	Kolman, Busby and Ross, "Discrete Mathematical Structures", PHI.
2	K.D. Joshi, "Foundations of Discrete Mathematics", Wiley, Estern Limited.
WEB REFERENCES	
1	www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf
2	home.iitk.ac.in/~arlal/book/mth202.pdf
3	https://egyankosh.ac.in/bitstream/123456789/20552/1/Unit-10.pdf
ASSIGNMENTS	
1	How to write PCNF, PDNF with and without using truth table.
2	Problem Solving Large and Small Samples.
GROUP TASKS :	
1	Discussion about CNF and DNF.
2	To use the Sampling in real life situation.
Course Designed By	
Dr.S.Shanmugasundaram	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the concept of Negation, Conjunction, Disjunction, Statement Formulas and Truth Table. Conditional and Bi-Conditional and Well Formed Formula.	K1/K2
CO2	To Practice logical operations and predicate calculus needed for computing skill.	K2/K3
CO3	The basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems.	K1/K2/K3
CO4	About large sample tests and its applications and get an idea of order statistics with its applications.	K4/K5/K6
CO5	Applying the different sampling methods for designing and selecting a sample from a population.	K3/K4/K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	L	L	M	M	L	S	L	M	M
CO2	M	S	L	M	M	L	S	M	M	M
CO3	L	M	L	M	M	L	S	M	M	M
CO4	L	L	S	L	L	L	M	M	M	M
CO5	L	L	L	L	L	L	S	M	M	M

S- Strong M- Medium L- Low

SEMESTER - I				
Course Code	21PCS02	DESIGN AND ANALYSIS OF ALGORITHMS	L	T
Core/Elective/Supportive		CORE COURSE - II	5	0
Pre-requisite	Knowledge on Data Structure		Academic Year 2021-2022	

COURSE OBJECTIVES:

- To inculcate the ability to analyze the asymptotic performance of algorithms.
- To introduce rigorous correctness proofs for algorithms.
- To bring in a familiarity with major algorithms and data structures.
- To demonstrate important algorithmic design paradigms and methods of analysis.
- To synthesize efficient algorithms in common engineering design situations.

SYLLABUS

Unit : I	Introduction and Divide & Conquer	12 hours
Algorithm - Algorithm Specification - Performance Analysis - Divide-And-Conquer: General Method - Binary Search - Finding the Maximum and Minimum - Merge Sort- Quick Sort - Selection.		
Unit : II	Greedy Method	12 hours
The General Method - Knapsack Problem - Job Sequencing with Deadlines - Minimum-Cost Spanning Trees - Optimal Storage on Tapes - Single Source Shortest Paths.		
Unit : III	Dynamic Programming	12 hours
The General Method- Multistage Graphs - All Pairs Shortest Path - Single-Source Shortest Paths: General Weights - Optimal Binary Search Trees - 0/1- Knapsack - The Traveling Salesperson Problem.		
Unit : IV	Back Tracking / Branch and Bound	12 hours
Back Traking: The General Method - The 8-Queens Problem - Some of Subsets - Graph Coloring - Hamiltonian Cycles - Knapsack Problem. Branch-And -Bound: The Method - 0/1 Knapsack Problem - Travelling Salesperson.		
Unit : V	NP-Hard and NP-Complete Problems	12 hours
Basic Concepts - Cooks 'Theorem - Np-Hard Scheduling Problems - Np Hard Code Generation Problems.		
		Total Lecture hours 60 hours

TEXT BOOKS

1	<i>Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran.</i> 2008. Fundamentals of Computer Algorithms. [Second Edition]. Galgotia Publication Pvt. Ltd. New Delhi.
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REFERENCE BOOKS

1	<i>Anany Levitin</i> , 2005, Introduction to the Design and Analysis of Algorithms. [First Edition] Pearson Education Asia. Beijing.
2	<i>Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein.</i> 2009, Introductionto Algorithms. [Third Edition] . PHI Pvt. Ltd. New Delhi.
3	<i>Sara Baase and Allen Van Gelder.</i> 2006. Computer Algorithms - Introduction to Design and Analysis [Third Edition], Pearson Education Asia. Beijing.

WEB REFERENCES

1	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/
2	https://www.coursera.org/specializations/algorithms
3	https://ocw.mit.edu/courses/.../6...design-and-analysis-of-algorithms.../lecture- notes

ASSIGNMENTS

1	Comparative study of various algorithms associated with the Divide and Conquer and justifications have to be produced in the form of Time and Space Complexities.
2	Graph based Algorithms Vs Tree based Algorithms.

Case Study

1	Analysis of Algorithms reflects in Human/Machine Computing.
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Course Designed By

Dr.R.Pugazendi

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the correctness of algorithms using inductive proofs and Analyze the worst-case running times of algorithms using asymptotic notations.	K1/K2/K4
CO2	Demonstrate the divide-and-conquer paradigm in terms of Searching and Sorting and explain when an algorithmic design situation calls for it.	K2/K3/K4
CO3	Understand the concepts of Knapsack, Spanning Tree, Shortest paths, Graphs, Trees and Travelling Salesman Problem Under the greedy paradigm and Dynamic Programming and explain when an algorithmic design situation calls for it.	K2/K3/K4
CO4	Describe the Concepts of 8-Queen, Subsets, Hamiltonian Cycle Under Backtracking and Understand the concepts of Branch Bound and explain when an algorithmic design situation calls for it.	K2/K3/K4
CO5	Enhance the knowledge on mathematical theorems by using NP-Hard/NP-Complete to evaluate the Performance of Algorithms under research perception.	K2/K3/K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	S	L	M	M	L	S	L	M	M
CO2	M	S	L	M	M	M	S	L	S	M
CO3	M	S	L	S	M	M	S	L	S	M
CO4	M	S	L	S	M	M	S	L	S	M
CO5	M	S	L	M	L	L	S	L	S	S

S - Strong M- Medium L- Low

SEMESTER - I					
Course Code	21PCS03	DOT NET PROGRAMMING	L	T	P
Core/Elective/Supportive		CORE COURSE - III	5	0	0
Pre-requisite	Knowledge on C & C++ Programming, and Windows applications			Academic Year	2021-2022

COURSE OBJECTIVES:

- Gain a comprehensive understanding of the philosophy and architecture of .NET Framework.
- Acquire a working knowledge of creating a rich internet Web application using the .NET Framework.
- To understand the Programming structure of C# in developing applications.
- To acquire knowledge on the usage of recent platforms in developing web applications.
- To provide depth knowledge about ADO.NET.

SYLLABUS

Unit : I	Understanding .Net	12 hours
Understanding .Net – The .Net Strategy – Origin of .Net Technology - Features - .Net Languages – Benefits of .Net approach - .Net framework – Architecture – Common Language Runtime – Common Type System – Common Language Specification –Base Class Library – IntermediateLanguageMSILcode–Assemblies–manifest–metadata–managedexecution– automatic memory management - .Net Security Model		
Unit : II	Developing ASP.NET Applications	12 hours
Developing ASP.NET Applications- ASP.NET Applications –Understanding ASP.NET Controls Overview of ASP.NET framework. Web form fundamentals – Web control classes –Using Visual Studio.NET-Validation and Rich Controls-State management-Tracing, Logging, and Error Handling.		
Unit : III	Overview of C#	12 hours
Overview of C# - Literals, Variables, and Data Types – Operators and Expressions – Decision making and Branching – Decision making and Looping – Methods in C# - Handling Array – Manipulating Strings – Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism – Interfaces - Operator Overloading – Delegates and Events – Managing Errors and Exceptions.		
Unit : IV	Application Development on .Net	12 hours
Application Development on .Net - Building Windows Applications – Creating a simple window form – Creating a window forms application using Tree view control- Accessing Data with ADO.NET – Working with Data Bound Controls.		
Unit : V	Web Based Application Development on .Net	12 hours
Web Based Application Development on .Net – Understanding Web forms – Creating a Web form – Adding Controls – Data binding – Database connectivity in Web Forms using ADO.Net - Web Services – SOAP, WSDL and Discovery – Building a Web Service – Creating the proxy.		
		Total Lecture hours
		60 hours
TEXT BOOKS		
1	V.R. Kavitha, "C# and .Net Framework", Sree Magnus Publications,2011.	
2	Mario Szpuszta,Mathew MacDonald,"Pro ASP.NET 4 in C# 2010",Apress Third Edition.2010	

REFERENCE BOOKS

- | | |
|---|---|
| 1 | Herbert Schildt, "The Complete Reference: C# 4.0", TataMcgraw Hill, 2012. |
| 2 | Mathew Mac Donald, "ASP.NET Complete Reference", TMH 2005. |
| 3 | Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003. |
| 4 | J. Liberty, "Programming C#", 2nd ed., O'Reilly, 2002. |

WEB REFERENCES

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|---|---|
| 1 | https://www.learningtree.com/training-directory/net-visual-studio-training/ |
| 2 | https://programmerblog.net/best-frameworks-for-net-developers/ |
| 3 | https://www.tutorialspoint.com/csharp/index.html |
| 4 | www.w3schools.com/ASP.Net/default.asp |
| 5 | www.w3schools.com/ADO.Net/default.asp |

ASSIGNMENTS

- | | |
|---|--|
| 1 | Benefits of .Net approach. |
| 2 | Web form fundamentals and Web control classes in ASP.Net |
| 3 | Database connectivity in Web forms. |

Course Designed By

Dr.D.Chitra

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Design and develop professional console and window based .NET application.	K1/K2/K3/K4
CO2	Understand the general programming structure of C# in developing software solutions based on user requirements.	K2/K3/K4/K5
CO3	Design and implement Windows Applications using Windows Forms and Data Binding Concepts.	K3/K4/K5/K6
CO4	Use ASP .NET controls in web applications.	K2/K3/K4/K5/K6
CO5	Create and manipulate data base driven ADO.NET web applications and web services.	K2/K3/K4/K5/K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	L	M	S	L	L	M	S	S
CO2	S	M	L	M	S	L	L	M	M	S
CO3	S	M	L	M	S	L	M	S	M	S
CO4	S	S	L	M	S	L	M	S	S	S
CO5	S	S	L	M	S	L	M	S	S	S

S- Strong M- Medium L- Low

SEMESTER- I				
Course Code	21PCS04	DISTRIBUTED OPERATING SYSTEMS	L	T
Core/Elective/Supportive		CORE COURSE - IV	5	0
Pre-requisite	Knowledge on Operating system		Academic Year 2021-2022	

COURSE OBJECTIVES:

- To understand hardware and software concepts in modern operating system.
- To gain knowledge about the Remote Procedure call and Clock synchronization.
- To understand the threads and system model.
- To learn about real-time and distributed file systems.
- To understand shared memory and Mach operating systems in distributed systems.

SYLLABUS

Unit : I	Hardware and Software Concepts	12 hours
What is a Distributed System – Hardware Concepts – Software Concepts – Design Issues – The Client – Server Model.		
Unit : II	Remote Procedure Call and Clock Synchronization	12 hours
Remote Procedure Call – Clock Synchronization – Mutual Exclusion – Election Algorithms – Deadlocks in Distributed Systems.		
Unit : III	Threads and Systems Models	12 hours
The Threads – System Models – Processor Allocation – Fault Tolerance.		
Unit : IV	Real-Time and Distributed File systems	12 hours
Real-Time Distributed systems – Distributed File System Design - Distributed File System Implementation -Trends in Distributed File Systems.		
Unit : V	Shared Memory and Case Study	12 hours
What is Shared Memory – Consistency Models – Page based Distributed Shared Memory – Case Study: MACH.		
	Total Lecture hours	60 hours

TEXT BOOKS

1	Andrew S.Tanenbaum, "Distributed Operating Systems", Pearson Education, 2002.
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REFERENCE BOOKS

1	George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia, 2002.
2	Hagit Attiya and Jennifer Welch, "Distributed Computing: Fundamentals, Simulations and Advanced Topics", Wiley, 2004.
3	Mukesh Singh, "Advanced Concepts in Operating Systems", McGrawHill Series in Computer Science, 1994.
4	A.S.Tanenbaum, M.Van Steen, "Distributed Systems", Pearson Education, 2004.
5	M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.

WEB REFERENCES

1	https://www.peterindia.net/DistributedOperatingSystem.html
2	https://www.microsoft.com/en-us/research/group/systems-research-group-redmond/
3	www.hpcs.cs.tsukuba.ac.jp/~tatebe/lecture/h23/dsys/dsd-tutorial.html

ASSIGNMENTS

1	Discuss a situation where a proxy can be used.
2	Difference between a local call and a remote call with example.
3	Demonstrate shared memory concept in distributed system.

Case Study

1	Modern Operating systems survey
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Course Designed By

Mr.E. Jayabalan

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Acquire skill set to concentrate on hardware and software in modern operating systems.	K1/K2/K4
CO2	Technically knows to develop new algorithms.	K2/K3/K4/K5
CO3	Develop new idea of system models in distributed operating system.	K2/K3/K4/K5
CO4	Understand the risk in real time systems associated with distributed file.	K2/K3/K4/K5
CO5	Developing a skill set in developing a distributed systems.	K2/K3/K4/K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	M	S	M	S	S	M	S
CO2	S	S	S	M	S	S	S	L	S	M
CO3	S	S	S	S	M	M	S	L	S	S
CO4	S	S	S	S	S	M	S	L	S	S
CO5	S	S	S	M	M	S	S	M	S	M

S - Strong; M- Medium; L- Low

SEMESTER - I						
Course Code	21PCSP1	ALGORITHM LAB	L	T	P	C
Core/Elective/Supportive		CORE PRACTICAL -I	0	0	2	3
Pre-requisite	Knowledge on Data Structure and C programming			Academic Year 2021-2022		

COURSE OBJECTIVES:

- To learn how to analyze a problem & design the solution for the problem.
- To Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.
- To develop the optimal solution, i.e., time complexity & space complexity must be very low.

LIST OF PRACTICALS

Practical 1	Divide and Conquer Strategy	3 Hours
Write a program to Merge Sort using Divide and Conquer strategy and evaluate the efficiency of its algorithm in terms of Best, Worst and Average cases.		
Practical 2	Greedy Approach	3 Hours
Write a program to find an optimal solution to the Knapsack instances n= 5, m=15, (p1,p2,...p5) = (10,5,15,7),and (w1,w2,...w5) = (2,3,5,7,1) using Greedy Method.		
Practical 3	Dynamic Programming	3 Hours
Write a program to Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.		
Practical 4	Dynamic Programming	3 Hours
Write a program to perform Travelling Salesman Problem using Dynamic Programming.		
Practical 5	Dynamic Programming	3 Hours
Write a program to perform BFS and DFS using traversal and searching strategies		
Practical 6	Back Tracking	3 Hours
Write a program to implement 8 Queens problem using backtracking and estimating the efficiency of N Queens.		
Practical 7	Back Tracking	3 Hours
Write a backtracking program for the sum of subsets to find all possible subsets of w that sum to m where w={5,7,10,12,15,18,20} and m=35.		
		Total Lecture hours 21 hours
Course Designed By		
Dr.R.Pugazendi		

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOMES	BLOOMS VERB
CO1	Implement the various sorting techniques and evaluate the performance.	K3/ K4/K5
CO2	Identify feasible solutions for different problems using greedy method and dynamic programming.	K1/K2/K3
CO3	Develop an application using graph algorithms.	K1/K2/K3
CO4	Make use of tree data structure to solve real world problems.	K2/K3
CO5	Identify feasible solutions for different problems by using Backtracking and evaluate the performance of it in terms of Best , Worst and Average.	K3/K4/K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	S	L	S	M	L	S	L	M	M
CO2	L	S	L	S	M	L	S	L	M	M
CO3	M	S	L	S	M	L	S	L	M	M
CO4	M	S	M	S	M	L	S	M	M	M
CO5	L	S	L	S	M	L	S	L	M	M

S - Strong M- Medium L- Low

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the C# environment and how to develop small programs.	K2/ K3
CO2	Develop programs using primitives and LINQ in C#.	K2/K3/K4
CO3	Create user interactive web pages using ASP.Net.	K4/K5/K6
CO4	Create simple data binding applications using ADO.Net Connectivity.	K4/K5/K6
CO5	Performing Database operations for Windows Form and Web applications.	K3/K4/K5/K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	M	L	M	S	L	M	L	M	M
CO2	M	M	L	M	S	L	M	L	M	M
CO3	M	L	L	M	S	L	M	M	S	S
CO4	M	L	L	M	S	L	M	M	S	S
CO5	S	L	L	S	S	L	M	M	S	S

S - Strong M- Medium L- Low

SEMESTER - I												
Course Code	21PCSM1	CYBER SECURITY	L	T	P	C						
Core/Elective/Supportive		MAJOR BASED ELECTIVE COURSE - I	4	0	0	4						
Pre-requisite	Knowledge on Information Technology				Academic Year 2021-2022							
COURSE OBJECTIVES:												
<ul style="list-style-type: none"> To understand the cyber security problems. To know the cyber targets. To obtain knowledge about cyber vulnerabilities and impacts, threats. Ability to develop improving cyber security. To explain the organizational steps, awareness and training and information sharing. 												
SYLLABUS												
Unit : I	Cyber Security Problems					12 hours						
Introduction: Background – The expectations of users and organizations – Cyber Security in the wider context – The Big Issues: Cyber Crime – Cyber bullying – Cyber warfare - Cyber Surveillance – Why we should care – What makes cyber security difficult?												
Unit : II	Cyber Targets					12 hours						
Cyber Targets: Individual targets – Business targets – Critical national infrastructure targets – Building targets – Academia and research targets – Manufacturing and industry targets.												
Unit : III	Cyber Vulnerabilities and Impacts, threats					12 hours						
Cyber Vulnerabilities and Impacts: Vulnerabilities – Impacts – Cyber Threats: Types of attackers – Motives- what drive an attacker – means – Cyber attack methods.												
Unit : IV	Improving Cyber Security					12 hours						
Risk Management overview: A general view of risk – Assets – vulnerabilities – Likelihood or probability – Qualitative and quantitative assessments – The risk management process – Business Continuity and Disaster recovery – Basic Cyber security steps: General security advice – Technical security advice – Mobile working.												
Unit : V	Organizational Security Steps					12 hours						
Organizational Security Steps: Security policies overview – Directive policies – Administrative policies – Communal policies – Technical policies – Awareness and Training - Information Sharing: Trust – Information Classification – Protection of Shared Information - Routes to Information sharing.												
						Total Lecture hours 60 hours						
TEXT BOOKS												
1	<i>David Sutton, "Cyber Security A Practitioner's Guide,"</i> , BCS, The Chartered Institute for IT 2017.											
REFERENCE BOOKS												
1	<i>Charles J. Brooks, Christopher Grow, Philip Craig Donald Short, "Cybersecurity Essentials",</i> (2018), John wiley and sons.											
2	<i>Lester Evans, "Cyber security: An Essential Guide to Computer and Cyber Security for Beginners, Including Ethical Hacking, Risk Assessment, Social Engineering, Attack and Defense Strategies, and Cyber warfare",</i> John Wiley and Sons.											
3	<i>Prof. AmitGarg Dr.Krishnan Kumar Goyal, " Cyber security",</i> 2019, Laxmi publications.											

WEB REFERENCES	
1	https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf
2	http://www.uou.ac.in/sites/default/files/sl/FCS.pdf
3	http://docshare04.docshare.tips/files/21900/219006870.pdf
4	https://onlinecourses.swayam2.ac.in/ugc19_hs25/ preview
ASSIGNMENTS	
1	Cyber attacks and their classification.
2	Different security models and security mechanisms.
Case Study	
1	Different types of cyber crimes, scams and frauds.
2	Digital Forensic Investigation Methods.
Course Designed By	
Mr.E. Jayabalan	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	To gain knowledge about what cyber security is all about, and a summary of the expectations of individuals and organisations who would be affected by a cyber-attack.	K1/K2/K3/ K4
CO2	Ability to learn Cyber targets, including finance organisations, commercial businesses, critical infrastructure, manufacturing, academia and research organisations, industrial control systems and government and military targets.	K2/K3/K4/ K5
CO3	Knowledge about cyber vulnerabilities and impacts	K2/K3/K4/ K5
CO4	Understand the concept of improving cyber security.	K2/K3/K4/ K5
CO5	Apply the knowledge gained in organizational security steps, training and awareness, information sharing.	K2/K3/K4/ K5/K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	S	S	M	S	S	M	S
CO2	S	M	S	M	S	S	S	M	S	S
CO3	S	S	M	M	M	S	S	S	L	M
CO4	S	S	M	S	M	L	S	S	L	L
CO5	S	S	M	S	M	M	S	S	M	M

S - Strong; M- Medium; L- Low

SEMESTER - I										
Course Code	21PCSM2	SOFTWARE PROJECT MANAGEMENT	L	T	P					
Core/Elective/ Supportive		MAJOR BASED ELECTIVE COURSE - II	4	0	0					
Pre-requisite	Basic Knowledge on Software Engineering			Academic Year 2021-2022						
COURSE OBJECTIVES:										
<ul style="list-style-type: none"> To understand the Software Project Planning and Evaluation techniques. To plan and manage projects, at each stage of the software development life cycle (SDLC). To learn about the activity planning and risk management principles. To manage software projects and control software deliverables. To develop skills to manage the various phases involved in project management and people management. To deliver successful software projects that support the organization's strategic goals. 										
SYLLABUS										
Unit : I	Project Evaluation And Project Planning			12 hours						
Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.										
Unit : II	Project Life Cycle And Effort Estimation			12 hours						
Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming- Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.										
Unit : III	Activity Planning And Risk Management			12 hours						
Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.										
Unit : IV	Project Management And Control			12 hours						
Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.										
Unit : V	Staffing In Software Projects			12hours						
Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.										
		Total Lecture hours	60 hours							

TEXT BOOKS	
1	<i>Bob Hughes, Mike Cotterell and Rajib Mall</i> ,2012. Software Project Management [Fifth Edition], Tata McGraw Hill, New Delhi.
REFERENCE BOOKS	
1	<i>Robert K. Wysocki</i> ,2011 .Effective Software Project Management , Wiley Publication.
2	<i>Walker Royce</i> ;1998 .Software Project Management, Addison-Wesley.
3	<i>Gopalaswamy Ramesh</i> ,2013.Managing Global Software Projects - McGraw Hill Education (India), Fourteenth Reprint .
WEB REFERENCES	
1	https://www.tutorialspoint.com/software_engineering/software_project_management
2	https://www.projectmanager.com/
3	https://www.e-booksdirectory.com/listing.php?category=106
ASSIGNMENTS	
1	Comparative study on various Project Mgmt Paradigms
2	Human Resource Vs Project management
Case Study	
1	Role of Project management in E. Governance
Course designed by	
Dr.R.Pugazendi	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the Secrets behind the Best Project Management by the way of proper planning in terms of setting objectives and scope followed by an Effective Evaluation in terms of Resources such as Man, Material and Money(3 M's).	K1/ K2/ K4
CO2	Familiar with the various S/W development models to develop quality S/W and practice with the various estimation techniques to estimate the effort required to complete the project	K3/ K5/ K6
CO3	Understand the importance of scheduling the project and consequences of schedule slippage by the way of assessing the risk.	K3/ K5
CO4	Understand the effectiveness of Project management in terms of Monitoring and tracking its process and S/W Configuration management to meet the current trends	K3/ K5
CO5	Assess the value of Human Resource Management in the Industrial Scenario	K4/ K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	L	M	L	S	M	M	S	M	M
CO2	S	M	M	M	M	L	M	S	S	S
CO3	L	M	L	L	M	L	L	S	M	M
CO4	L	L	M	L	S	S	L	M	M	M
CO5	L	L	L	L	L	L	L	S	L	M

S - Strong **M**- Medium **L**- Low

SEMESTER - II						
Course Code	21PCS05	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE -II	L	T	P	C
Core/Elective/ Supportive		CORE COURSE - V	5	0	0	5
Pre-requisite	Knowledge on Computer Languages and Mathematics			Academic Year 2021-2022		

COURSE OBJECTIVES:

- To give an overview of the theoretical foundations of computer science from the perspective of formal languages
- To illustrate finite state machines to solve problems in computing
- To explain the hierarchy of problems arising in the computer sciences.
- To familiarize Regular grammars, context free grammar.

SYLLABUS

Unit : I	12 hours
Finite Automata : Automata-Finite Automata (FA) - Deterministic Finite Accepters(DFA) - Non-deterministic Finite Accepters (NFA). Chapter 1- Sec 1.2 (Automata) Chapter 2- Sec 2.1 and 2.2	
Unit : II	
Regular Languages and Regular Grammars: Regular Expressions - Connection between Regular Expressions and Regular Languages -Regular Grammars. Chapter 3- Sec 3.1, 3.2 and 3.3	
Unit : III	12 hours
Context - Free languages and Pushdown Automata: Context - Free Grammars (CFG) - Parsing and Ambiguity-Non-Deterministic push down Automata - Trees - Pushdown Automata and Context-Free languages. Chapter 5- Sec 5.1 and 5.2 Chapter 7- Sec 7.1 and 7.2	
Unit : IV	12 hours
Transportation problems and Assignment problems : Solution of a Transportation problem- Finding an initial basic feasible solution- Test for optimality- Solution methods of Assignment problems - The Travelling Salesman problem. Chapter 10- Sec 10.8, 10.9 and 10.10 Chapter 11- Sec 11.3 and 11.7	
Unit : V	12 hours
Network Scheduling by PERT/CPM : Introduction – Network: Basic components- Rules of Network Construction- Critical Path Analysis- Probability Considerations in PERT. Chapter 25- Sec 25.1, 25.2 25.4 25.6 and 25.7	
	Total Lecture hours
	60 hours

TEXT BOOKS

1	<i>Peter Linz, " An Introduction to Formal languages and Automata," 4th Edition, Narosa Publications.</i>
2	<i>KantiSwarup, P.K.Gupta and Man Mohan, "Introduction to Management Science Operations Research", 17th Edition, Sultan Chand & Sons.</i>

REFERENCE BOOKS	
1	A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
2	Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
3	Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

WEB REFERENCES	
1	en.wikipedia.org/wiki/
2	mathworld.wolfram.com
3	wiki.answers.com

ASSIGNMENTS	
1	Automata theory
2	Languages and Grammar
3	Transportation Problem and PERT

GROUP TASKS	
1	Two Group Tasks can be given in the form of Seminar, Group Discussion, and Quiz etc. in the topics Finite Automata theory modals Transportation and PERT,CPM Problems

Course designed by	
Dr.S.Shanmugasundaram	

COURSE OUTCOMES:	
On the successful completion of the course, student will be able to:	

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Identify basic concepts of formal languages of finite automata techniques	K1/ K2/K4
CO2	Analyze To Design Finite Automata's for different Regular Expressions and Languages	K3/K5/K6
CO3	Develop to Construct context free grammar for various languages	K3/K5
CO4	Solve various problems in Transportation and Assignment techniques.	K3/K5
CO5	Develop the concept of Critical Path Method (CPM) and PERT calculations and their Algorithms.	K4/K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	S	L	S	L	L	S	M	M	M
CO2	M	M	L	S	M	L	S	M	M	M
CO3	M	M	L	M	L	M	S	M	M	M
CO4	L	L	L	L	L	L	M	M	M	M
CO5	L	L	L	L	L	L	M	M	M	M

S - Strong M- Medium L- Low

SEMESTER - II						
Course Code	21PCS06	DATA SCIENCE	L	T	P	C
Core/Elective/Supportive		CORE COURSE - VI	5	0	0	5
Pre-requisite	Knowledge on Big Data & Statistical Methods				Academic Year 2021-2022	

COURSE OBJECTIVES:

- To Understand the impact of Big Data Platform and its Use cases.
- To apply analytics on Structured and Unstructured Data.
- To Understand Data Analytics life cycle and information flows in a Business.
- To become familiar with Statistical Methods for Evaluation.
- Exposure of Data Analytics with R.

SYLLABUS

Unit : I	Digital data	12 hours
Types of Digital Data - Classification of Digital Data - Big Data: Characteristics of Data-volution of Big Data - Definition of Big Data - Challenges with Big Data - Volume, Velocity, Variety - Other Characteristics of Data - Need for Big Data - Information Consumer or Information Producer - Traditional Business Intelligence (BI) versus Big Data - A Typical Data Warehouse Environment - Changing in the Realms of Big Data.		
Unit : II	Big Data Analytics	12 hours
Big Data Analytics - Sudden Hype Around Big Data Analytics - Classification of Analytics - Top Challenges Facing Big Data - Importance of Big Data Analytics - Technologies to Meet the Challenges Posed by Big Data - Data Science - Data Scientist - Terminologies Used in Big Data Environments - Basically Available Soft State Eventual Consistency (BASE).		
Unit : III	Data Analytics Lifecycle	12 hours
Data Analytics Lifecycle Overview - Phase 1: Discovery - Phase 2: Data Preparation - Phase3: Model Planning -Phase 4: Model Building - Phase 5: Communicate Results - Phase 6: Operationalize.		
Unit : IV	Review of Basic Data Analytic Methods Using R	12 hours
Introduction to R : R Graphical User Interface Data import and Export - Attribute and Data Types -Descriptive Statistics. Exploratory Data Analysis : Visualization Before Analysis - Dirty Data - Visualizing a Single Variable - Data Exploration Versus Presentation. Statistical Methods for Evaluation: Hypothesis Testing-Difference of Means-Wilcoxon Rank-Sum Test-Type I and Type II Errors-Power and Sample Size-ANOVA.		
Unit : V	Advanced Analytical Theory and Methods	12 hours
Clustering: Overview of Clustering-K-means : Use cases - Overview - Determining the number of Clusters - Diagonistics - Reasons to choose and Cautions. Classification: Decision Trees -Overview - General Algorithm - Decision Tree Algorithm -Evaluating a Decision tree - Decision tree in R. Naive Bayes: Baye's Theorem - Classifier - Smoothing - Diagnostics - Naïve Bayes in R.		
Total Lecture hours		60 hours

TEXT BOOKS	
1	<i>Seema Acharya, Subhasini Chellappan, "Big Data and Analytics" Wiley 2015.</i>
2	<i>EMC Education services, "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley 2015.</i>
REFERENCE BOOKS	
1	<i>Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.</i>
2	<i>Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press, 2013</i>
3	<i>Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.</i>
4	<i>Pete Warden, "Big Data Glossary", O'Reilly, 2011.</i>
WEB REFERENCES	
1	https://www.johndcook.com / R_language_for_programmers.html
2	https://www.goodreads.com/author/show/14674681.Seema.Acharya
3	https://www.tutorialspoint.com/big_data_analytics/big_data_analytics_pdf_version.html
ASSIGNMENTS	
1	Applications of Big data.
2	Big data with high-powered analytics can accomplish business-related tasks -How?
3	Perform ADD, MUL and SUB operations using matrices using R.
4	Implementation of K-Means Clustering with R.
Case Study	
1	Data Science in Mathematical and Statistical concepts.
Course Designed By	
Dr. M.Malathi	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the concept of Data Science.	K1/K2
CO2	Apply Various Techniques to meet the challenges in Big Data.	K2/K3
CO3	Understand and interpret Various Phases of Data Analysis Life cycle	K1/K3
CO4	Analyze the Basic concepts of Statistical Methods for Evaluation	K4/K5
CO5	Evaluate the algorithms of Big Data for different usage scenarios	K5/K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	L	L	M	L	L	S	L	M	L
CO2	M	M	L	M	L	L	S	L	M	M
CO3	L	L	L	M	M	L	S	L	S	M
CO4	M	S	L	S	S	M	S	L	S	M
CO5	M	S	M	S	S	M	S	L	S	S

S - Strong M- Medium L- Low

SEMESTER - II					
Course Code	21PCS07	ADVANCED WEB TECHNOLOGY	L	T	P
Core/Elective/Supportive		CORE COURSE - VII	5	0	0
Pre-requisite	Web site Design, Development and SQL			Academic Year 2021-2022	

COURSE OBJECTIVES:

- To understand the major areas and challenges of web programming.
- To understand the advanced topics in HTML5,CSS3, JavaScript
- To learn the fundamentals of PHP and MYSQL
- To understand the importance of server side programming and web development
- Ability to develop static web pages and web applications.

SYLLABUS

Unit : I	HTML5 and CSS3	12 hours
HTML5 and CSS3: Semantic Elements-Form Elements- Form input Types-Form Attributes Media Elements-Canvas-SVG-Drag and Drop-CSS3: Introduction -Borders-Backgrounds-Text Effects-Fonts-Transforms-Transitions-Animations.		
Unit : II	JavaScript	12 hours
JavaScript: Start with JavaScript – Conditionals – Loops – Avoid Repeating – Objects – Documents – Browsers – Installing JQuery - Adding JQuery - Selecting Elements – HTML using JQuery – Changing attributes and Styles – Working with Forms – Mouse and Keyboard Events		
Unit : III	PHP	12 hours
PHP: Introduction to PHP – Language Basics : variables – constants-data types – operators – Statements – Functions –Strings-Arrays.		
Unit : IV	PHP	12 hours
Objects – Web Techniques- Databases-Graphics-PDF-Security- Debugging PHP - Dates and Times.		
Unit : V	MySQL	12 hours
MySQL: MySQL Installation and Configuration – SQL Basics – MySQL Data types – MySQL Operators – MySQL functions – Working with Databases and Tables – Working with Data – Joins – Sub queries – Transactions - Working with Strings – Working with Dates and Times – Sorting Query Results – Generating Summary.		
		Total Lecture hours 60 hours

TEXT BOOKS

1	Brian P. Hogan, "HTML5 and CSS3, Level Up with Today's Web Technologies, The Pragmatic Programmers", Second Edition,2013.
2	RasmusLerdorf,KevinTatroeandPeterMacIntyre,"ProgrammingPHP",O'Reilly, 2nd Edition/3rd Indian Reprint, 2009.(Unit III and IV)
3	Vikram Vaswani, "MYSQL: The Complete Reference", 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.(UnitV)

REFERENCE BOOKS

1	Ed Tittel, Chris Minnick," Beginning HTML5 and CSS3 for Dummies",2013.
2	Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint2009.
3	Steve Suchring, "MySQL Bible", John Wiley,2002

WEB REFERENCES	
1	https://www.opensource.org
2	https://www.w3schools.com/php/default.asp
3	https://www.w3schools.com/php/php_mysql_intro.asp
4	www.mysqltutorial.org
ASSIGNMENTS	
1	A Web Page in HTML to show all the Text, Color, Background and Font Elements.
2	Web Techniques and Objects in PHP.
3	Create a webpage to show various confectionary items using ordered list and unordered List.
4	Design a webpage to store information about a student.
Course Designed By	
Dr.D.Chitra	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Distinguish web-related technologies.	K1/K2/K3/K4
CO2	Use advanced topics in HTML5, CSS3, JavaScript.	K2/K3/K4/K5
CO3	Use PHP to access a MYSQL database.	K2/K3/K4/K5
CO4	Understand the concept of server side programming and web development.	K2/K3/K4/K5 /K6
CO5	Design and implement dynamic web applications.	K3/K4/K5/K6
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	L	S	S	M	M	M	S	S
CO2	S	M	L	M	S	M	M	M	S	S
CO3	S	M	L	H	S	L	M	S	M	S
CO4	S	M	M	S	S	M	M	S	M	S
CO5	S	M	M	S	S	M	M	S	M	S

S-Strong M-Medium L-Low

SEMESTER - II					
Course Code	21PCS08	ADVANCED DATA BASE MANAGEMENT SYSTEMS	L	T	P
Core/Elective/Supportive	CORE COURSE -VIII			5	0
Pre-requisite	Knowledge on C & C++ Programming, and Windows applications			Academic Year 2021-2022	

COURSE OBJECTIVES:

- Acquire Knowledge of System Architecture, Distributed Databases, Advanced data processing and advanced databases like spatial databases, temporal databases and multimedia databases.
- To understand the DBMS architecture, query processing and optimization.
- To provide depth knowledge about Advanced Transaction Processing.
- Acquire Knowledge of NoSQL and Mongo DB.
- To acquire knowledge on the usage of the Data model and working with data.

SYLLABUS

Unit : I	Database-System Architectures	10 hours
Database-System Architectures: Centralized and Client-Server Architectures - Server System Architectures - Parallel Systems - Distributed Systems - Network Types. Distributed Databases: Homogeneous and Heterogeneous Databases - Distributed data storage - Distributed transactions - Commit protocols - Concurrency control in Distributed Databases.		
Unit : II	Spatial and Temporal Data and Mobility	10 hours
Spatial and Temporal Data and Mobility : Time in Databases - Spatial and Geographic Data - Multimedia Databases - Mobility and Personal Databases. Advanced Transaction Processing: Transaction-Processing Monitors - Transactional Workflows - E-Commerce - Main-Memory Databases - Real-Time Transaction Systems - Long Duration Transactions.		
Unit : III	Why NoSQL?	10 hours
Why NoSQL?: The Value of Relational Databases - Impedance Mismatch - The Emergence of NoSQL- Aggregate Data Models: Aggregates - Key-Value and Document Data Models - Column-Family Stores.		
Unit : IV	Details on Data Models	10 hours
Details on Data Models: Graph Databases - Schemaless Databases - Modeling for Data Access. Distribution models: Single Server - Sharding - Master-Slave Replication - Peer-to-Peer Replication - Combining Sharding and Replication.		
Unit : V	Introduction to MongoDB	10 hours
Introduction to MongoDB - Installing MongoDB for windows - The Data Model: Designing the Database - Building Indexes - Working with Data : Inserting Data into Collections - Querying for Data - Updating Data - Renaming a Collection - Removing Data - Implementing Index - Related Functions - GridFS: Working with GridFS - Command-Line Tools.		
	Total Lecture hours	50 hours

TEXT BOOKS

1	<i>Abraham Silberschatz, Henry F Korth , S Sudarshan, "Database System Concepts", 6th edition , McGraw-Hill International Edition , 2011</i>
2	<i>C.J.Date, A.Kannan, S.Swamyathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, Reprint 2016</i>
3	<i>Eric Redmond, JimR.Wilson,"Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSql movement", The Pragmatic Bookshelf, 2012.</i>
4	<i>David Hows, Peter Membrey, EelcoPlugge, "MongoDB Basics",Apress, 2014.</i>

REFERENCE BOOKS

1	<i>Pramod J. Sadalage Martin Fowler, "NoSQL Distilled - A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education, 2013.</i>
2	<i>Ramez Elmasri, Shamkant B Navathe, "Fundamental of Database Systems", Pearson, 7th edition, 2016.</i>
3	<i>Thomas Connolly, Carolyn Begg., "Database Systems a practical approach to Design, Implementation and Management ", Pearson Education, 2014.</i>

WEB REFERENCES

1	https://nptel.ac.in/courses/106106093/
2	https://www.tutorialspoint.com/dbms/
3	https://www.w3schools.in/dbms/
4	https://onlinecourses.swayam2.ac.in/aic20_sp36/preview
5	https://www.tutorialspoint.com/mongodb/index.html
6	https://docs.mongodb.com/manual/tutorial/

ASSIGNMENTS

1	Concurrency control in Distributed Databases
2	Multimedia database application
3	Modeling for MongoDB

Course Designed By

Mr.R.Venkatachalam

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Knowledge about system architecture and advanced topics like Spatial, temporal and Multimedia databases.	K1/K2/K3/K4
CO2	Understand the concept of DBMS architecture and get knowledge of query processing and optimization.	K2/K3/K4/K5
CO3	Understand how transactions are preprocessed in a database.	K2/K3/K4/K5 / K6
CO4	Know about the NoSQL and MongoDB.	K2//K4/K5/K6
CO5	Create knowledge on the usage of the Data model and working with data	K2/K3/K4/K5/K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	M	S	S	M	M	M	M	S
CO2	S	M	M	S	S	M	M	M	M	S
CO3	S	M	M	S	S	L	L	L	L	S
CO4	M	M	M	S	S	L	L	M	L	S
CO5	M	M	M	S	S	L	L	M	L	S

S- Strong M- Medium L- Low

SEMESTER - II					
Course Code	21PCSP3	DATA ANALYSIS USING R	L	T	P
Core/Elective/Supportive		CORE PRACTICAL - III	0	0	2
Pre-requisite	Prior Knowledge on any programming Language			Academic Year 2021-2022	

COURSE OBJECTIVES:

- To Understand the different data types & different data structures in R.
- To learn about R Programming from a Mathematical & Statistical Perspective.
- To gain knowledge about data analytics in real time applications.

LIST OF PRACTICALS

Practical 1	3 Hours
Import data from docx, xls, txt and other formats	
Practical 2	3 Hours
Write a R program to <ol style="list-style-type: none"> Create a 5×4 matrix, 3×3 matrix with labels and fill the matrix by rows and 2×2 matrix with labels and fill the matrix by columns. Create two 2×3 matrix and add, subtract, multiply and divide the matrixes. Access the element at 3rd column and 2nd row, only the 3rd row and only the 4th column of a given matrix Concatenate two given matrices of same column but different rows Find row and column index of maximum and minimum value in a given matrix. 	
Practical 3	3 Hours
Write a R program to create a data frame from four given vectors <ol style="list-style-type: none"> get the structure of a given data frame get the statistical summary and nature of the data of a given data frame. extract specific row / column from a data frame using column name add a new row / column in a given data frame set operations with data frames 	
Practical 4	3 Hours
Create different types of graphs using ggplot for a Dataset	
Practical 5	3 Hours
Perform min-max normalization for a dataset and show the result using ggplot	
Practical 6	3 Hours
Calculate Mean, Median and Standard deviation for a data set and perform t-test.	
Practical 7	3 Hours
Handling missing values in a dataset: CountNA, ReplaceNA	
Practical 8	3 Hours
Perform statistical correlation for comparing two variables.	
Practical 9	3 Hours
Perform various Data Transformation operations using <ol style="list-style-type: none"> filter() arrange() select() mutate() summarize() 	

Practical 10	3 Hours
Explore the distribution of each of the x, y, and z variables in diamonds. What do you learn? Explore the distribution of price.. Do you discover anything unusual or surprising?	
	Total Lecture hours
Course Designed By	
Dr. M.Malathi	

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Describe the data in vectors and Matrices.	K2/ K3
CO2	Apply the knowledge of R to create a data frame from given vectors.	K3/ K6
CO3	Develop R graphs to visualize results using ggplot.	K2/ K3
CO4	Analyze data sets to create hypotheses and identify appropriate statistical tests.	K4/ K6
CO5	Evaluate various data transformation operations.	K4/ K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	L	L	M	M	L	S	L	M	M
CO2	M	M	M	M	M	L	S	L	M	M
CO3	L	L	L	M	M	L	S	L	M	M
CO4	M	M	M	S	M	M	S	M	M	M
CO5	M	M	L	S	M	M	S	L	M	M

S - Strong M- Medium L- Low

SEMESTER - II				
Course Code	21PCSP4	ADVANCED WEB TECHNOLOGY - LAB	L	T
Core/Elective/Supportive	CORE PRACTICAL -IV		0	0
Pre-requisite	Knowledge of basic SQL and basic Web technologies such as HTML,CSS, and JavaScript		Academic Year 2021-2022	

COURSE OBJECTIVES:

- To introduce web-related technologies.
- To develop web based application using suitable client side technologies.
- Creating Server-side scripting programming and database access.

LIST OF PRACTICALS

Practical 1	Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems: a) Parameter: A string b) Output: The position in the string of the leftmost vowel c) Parameter: A number d) Output: The number with its digits in the reverse order.	3 Hours
Practical 2	Write a java script program which compute, the average marks of the following students then this average is used to determine the corresponding grade.	3 Hours
Practical 3	Write a program using PHP and HTML to create a form and display the details entered by the user.	3 Hours
Practical 4	Write a PHP program to display a digital clock which displays the current time of the server.	3 Hours
Practical 5	Write a PHP Program for Implement simple calculator operations.	3 Hours
Practical 6	To develop a registration form using PHP and do necessary validations • Design the HTML form with elements username, first name, last name, password, confirm password, email, gender etc. • Display the user input using PHP.	3 Hours
Practical 7	Design the personal information form, submit and retrieve the form data using PHP \$_POST,\$_GET,\$ REQUEST variable.	3 Hours
Practical 8	Write a program to Develop student registration form and display all the submitted data on another page.	3 Hours
Practical 9	PHP Program for implement: a) create a table in MySQL. b) Insert record into a table using MySQL.	3 Hours
Practical 10	Write a PHP program to connect to a database and retrieve data from a table and show the details in a neat format • Mark list of a student is entered and saved to MySQL table using PHP • Data stored in MySQL table is displayed.	3 Hours
Total Lecture hours		30 hours
Course Designed By		
Dr.D.Chitra		

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the major areas and challenges of web programming..	K1/K2/ K3
CO2	Develop programs using advanced topics in HTML5 and JavaScript.	K2/K3/K4
CO3	Use a Server-side scripting language, PHP	K4/K5/K6
CO4	Use PHP to access a MYSQL database.	K4/K5/K6
CO5	Design and implement static web pages and interactive Web applications.	K3/K4/K5/K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	L	M	S	L	M	M	M	S
CO2	M	M	L	M	S	L	M	M	M	M
CO3	S	M	L	M	S	L	M	M	S	S
CO4	S	M	L	M	S	L	M	M	S	S
CO5	S	M	L	S	S	L	M	M	S	S

S - Strong M- Medium L- Low

SEMESTER - II								
Course Code	21PCSM3	CLOUD COMPUTING	L	T	P C			
Core/Elective/Supportive		MAJOR BASED ELECTIVE COURSE - III	4	0	0 4			
Pre-requisite		Knowledge on Networking	Academic Year 2021-2022					
COURSE OBJECTIVES:								
<ul style="list-style-type: none"> To understand the cloud computing foundation and architecture. To know the technical aspects of virtualization and data storage in cloud environments. Acquire skill set to develop cloud services and security. To obtain knowledge about SOA and computing tools. Ability to develop cloud applications with future trends. 								
SYLLABUS								
Unit : I	Cloud Computing Foundation and Computing Architecture		12 hours					
Cloud Computing Foundation: Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing. Cloud Computing Architecture: Cloud Computing Technology – Cloud Architecture – Cloud Modelling and Design.								
Unit : II	Virtualization and Storage		12 hours					
Virtualization: Foundations – Grid, Cloud and Virtualization – Virtualization and cloud computing Data Storage and Cloud Computing : Data Storage – Cloud Storage Cloud Storage from LANs to WANs.								
Unit : III	Cloud Computing Services and Security		12 hours					
Cloud Computing Services: Cloud Computing Elements – Understanding Services and Applications by Type – Cloud Services – Cloud Computing at Work. Cloud Computing and Security: Risk in Cloud Computing – Data Security in Cloud – Cloud Security Services.								
Unit : IV	SOA and Cloud Computing Tools		12 hours					
SOA and Cloud Computing: SOA Foundation – SOA's Experience with Cloud – Business Process Management (BPM) and Cloud – Cloud Computing Tools: Tools and Technologies for Cloud – Cloud Mashups - Apache Hadoop – Cloud Tools.								
Unit : V	Cloud Applications and Future Cloud		12 hours					
Cloud Applications: Moving Applications to the Cloud - Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications- Future Cloud: - Future Trends – Mobile Cloud - Autonomic Cloud Engine – Multimedia Cloud – Energy Aware Cloud Computing – Jungle Computing – Case Study								
Total Lecture hours					60 hours			

TEXT BOOKS	
1	A.Srinivasan,J.Suresh,"Cloud Computing A Practical Approach for Learning and Implementation", Pearson, 2014.
REFERENCE BOOKS	
1	Rajiv Chopra, " Cloud Computing", New Age International Publishers, 2017.
2	Arshdeep Bahga, Vijay Madisetti, "Cloud Computing A Hands-on Approach", University Press, 2014.
3	Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education (India),2017.
WEB REFERENCES	
1	https://www.tutorialspoint.com/cloud_computing/index.htm
2	https://www.youtube.com/watch?v=EN4fEbcFZ_E
3	https://www.youtube.com/watch?v=gIWel4gFZaY
ASSIGNMENTS	
1	To do installation and configuration Hadoop
2	To deploy an application as a cloud service using MS Azure.
CASE STUDY	
1	To use existing cloud characteristics and service models.
Course Designed By	
Mr.E. Jayabalan	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	To provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications .	K1/K2/K3/K4
CO2	Ability to learn virtualization and data storage.	K2/K3/K4/K5
CO3	Knowledge about cloud computing services and security.	K2/K3/K4/K5
CO4	Understand the concept of SOA and Computing tools.	K2/K3/K4/K5
CO5	Apply the knowledge gained in exploring, applications and future trends.	K2/K3/K4/K5 /K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES										
COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	S	S	M	S	S	M	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	M	M	S	S	S	M	L
CO4	S	S	M	S	L	L	S	S	M	M
CO5	S	S	M	S	L	M	S	S	L	M

S – Strong; M- Medium; L- Low

SEMESTER - II						
Course Code	21PCSM4	SOCIAL NETWORK ANALYSIS	L	T	P	C
Core/Elective/Supportive		MAJOR BASED ELECTIVE COURSE - IV	4	0	0	4
Pre-requisite	Knowledge on Web/Internet, Data Mining and Social Media				Academic Year	2021-2022

COURSE OBJECTIVES:

- To Understand the concept of semantic web and related applications.
- To Learn knowledge representation using ontology.
- To Understand human behavior in social web and related communities.
- To Learn visualization of social networks.

SYLLABUS

Unit : I	Introduction	12 hours
Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.		
Unit : II	Modeling, Aggregating and Knowledge Representation	12 hours
Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language- Modeling and aggregating social network data: State-of-the-art in network data representation -Ontological representation of social individuals - Ontological representation of social relationships-Aggregating and reasoning with social network data - Advanced representations.		
Unit : III	Extraction and Mining Communities In Web Social Networks	12 hours
Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi- Relational characterization of dynamic social network communities.		
Unit : IV	Predicting Human Behavior and Privacy Issues	12 hours
Understanding and predicting human behavior for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.		
Unit : V	Visualization and Applications of Social Networks	12 hours
Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.		
Total Lecture hours		60 hours

TEXT BOOKS	
1	<i>Peter Mika</i> , 2007. Social Networks and the Semantic Web, First Edition, Springer 2007.
2	<i>Borko Furht</i> , 2010. Handbook of Social Network Technologies and Applications, 1st Edition, Springer.
REFERENCE BOOKS	
1	<i>Guandong Xu ,Yanchun Zhang and Lin Li</i> ,2011.Web Mining and Social Networking Techniques and applications, First Edition, Springer, 2011.
2	<i>Dion Goh and Schubert Foo</i> , 2008.Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet.
3	<i>Max Chevalier, Christine Julien and Chantal Soulé-Dupuy</i> , 2009. Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet.
WEB REFERENCES	
1	https://www.sciencedirect.com/topics/social-sciences/social-network-analysis
2	https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-019-1599-6
3	https://www.coursera.org/learn/social-network-analysis
ASSIGNMENTS	
1	Consequences of Social Network in the Real World Environment
2	Applications of Social Networks
CASE STUDY	
1	Research Directions for IT Students in Social Network
Course Designed By	
Dr.R.Pugazendi	

COURSE OUTCOMES:		
On the successful completion of the course, student will be able to:		
S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the Concepts of Semantic Web , Social Network and Analyzing Factors of Social Network	K2
CO2	Describe the Mechanism of Ontology Modeling, Aggregation and Knowledge Representation on Social Network and its Data	K2/K3
CO3	Apply the Mining Concepts for Extracting and Detecting the Communities in the Social Network	K2/K3/K4
CO4	Apply the Mining Concepts for Predicting the human behavior in the Social Network and analyze the security issues	K2/K3/K4
CO5	Acquire the knowledge on Graph Theory for Visualizing online Social Networks and make survey of various applications	K2/K3/K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create		

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	L	M	L	L	L	M	S	L	M	M
CO2	L	S	L	S	L	M	S	L	M	M
CO3	S	S	L	S	M	M	S	M	S	M
CO4	S	S	L	S	M	M	S	M	S	M
CO5	L	M	L	M	M	L	S	M	M	L

S - Strong **M**- Medium **L**- Low

SEMESTER - III						
Course Code	21PCS09	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
Core/Elective/Supportive	CORE COURSE - IX			6	0	0 5
Pre-requisite	Knowledge on Computer Networks			Academic Year 2021-2022		

Course Objectives:

- To understand the basics of Network Security & Symmetric Key Ciphers.
- To know about various Public key cryptography Algorithms.
- To understand the concept of Hash Functions & Authentication Codes. .
- To study about Key Management and Wireless Security.
- To impart knowledge on IP & E-Mail Security.

Unit: I	Introduction & Symmetric-key Ciphers	12 hours
Introduction - Need for Security - Cryptographic Attacks - Services and Mechanisms. Symmetric - key Ciphers: Substitution Ciphers - Transposition Ciphers - Stream and Block Ciphers. Data Encryption Standard (DES) - Advanced Encryption Standard (AES).		
Unit: II	Number Theory & Public Key Cryptography	12 hours
Introduction to Number Theory: Fermat's and Euler's Theorem. Public Key Cryptography & RSA: Principles of Public Key Cryptosystem - The RSA Algorithm - Diffe-Hellman Key Exchange - Elliptic Curve Arithmetic - Elliptic Curve Cryptography.		
Unit: III	Cryptographic Hash Functions & Authentication Codes	12 hours
Message Authentication - Digital Signatures - Brute - Force Attacks - Cryptanalysis - Secure Hash Algorithm (SHA-512) Message Authentication Codes: Message Authentication Requirements - Message Authentication Functions - Security of MAC's.		
Unit: IV	Key Management & Wireless Security	12 hours
Distribution of Public keys - X.509 Certificates. Transport Level Security : Web Security Considerations . Secure Socket Layers - HTTPS- Secure Shell (SSH). Wireless Network security : Wireless Security - Mobile Device Security - IEEE 802.11 Wireless LAN Overview.		
Unit: V	E-Mail & IP Security	12 hours
S/MIME - Domain Keys Identified Mail - IP Security: IP Security Overview - IP Security Policy -Encapsulation Security Payload - Intrusion Detection System (IDS).		
		Total Lecture hours 60 hours

TEXT BOOKS

1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI 6th Edition, 2017.
2	Behrouz A. Foruzan, Cryptography and Network Security, 2nd Edition, Tata McGraw Hill2013.

REFERENCE BOOKS

1	Neal Krawetz, "Introduction to Network Security", India Edition, Thomson Delmar Learning, 2007.
2	V.K. Pachghare, "Cryptography and Information Security", PHI Learning Private Limited, 2009.
3	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt.Ltd

WEB REFERENCES	
1	http://www.nptel.iitm.ac.in/courses/106105031/
2	https://www.tutorialspoint.com/cryptography/index.htm
3	https://www.gatevidyalay.com/tag/cryptography-and-network-security-notes/
4	http://www.engppt.com/2012/10/cryptography-and-network-security.html
5	https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
ASSIGNMENTS	
1	Security services & different types Ciphers
2	Fermat's and Euler's Theorem with examples
3	SHA 512 & MACS
4	SSH & IEEE 802.11
5	S/MIME & IDS Concepts
Course Designed By	
Dr. M.Malathi	

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Understand the Symmetric Key Ciphers and Security Concepts.	K1/K2
CO2	Illustrate various Public Key Cryptography Techniques.	K2/K3
CO3	Understand and Analyze Cryptography Hash Functions and Authentication Codes.	K2/K4
CO4	Evaluate Key Management and Wireless Security Concepts.	K4/K5
CO5	Analyze the IP Security & E- Mail Security to overcome the attacks	K3/K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

MAPPING OF COURSE SPECIFIC OUTCOMES(PO)

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	M	S	M	L	S	M	L	M	L
CO2	S	M	M	L	L	S	M	L	L	L
CO3	M	M	L	M	M	S	S	L	L	L
CO4	L	M	L	M	M	S	M	M	L	L
CO5	L	L	M	S	S	S	L	M	L	L

S - Strong M- Medium L- Low

Course Code	21PCS10	ADVANCED JAVA PROGRAMMING	L	T	P	C
Core/Elective/Supportive		Core Course - X	6	0	0	5
Pre-requisite	Knowledge on core Java				Academic Year 2021-2022	

Course Objectives:

- To become familiar with the advanced features of Java Language
- To understand the AWT, Swing Components and JDBC architecture.
- To understand Java Servlets and their life cycle and JSP technology.
- To obtain knowledge about RMI.
- To develop reusable components using JavaBeans.

Expected Course Outcomes:

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

CO1	Effectively utilize the java package for development of software.	K1/K2/K3/K4
CO2	Gain the knowledge of AWT, Swing Components and interact with database using JDBC.	K2/K3/K4/K5
CO3	Gain the knowledge of Server Side programming by implementing Servlet and JSP.	K2/K3/K4/K5
CO4	Design and develop various applications using RMI.	K2/K3/K4/K5
CO5	Ability to develop enterprises applications.	K2/K3/K4/K5/K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Unit: I	Collections and I/O Streams	12 hours
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Collections: Framework – Interface – Implementation classes – Array List classes – Linked Classes – Array List Vs Linked List –Hash Set-Tree Set-Priority Queue Class – Hash Map-Linked Map-Tree Map classes – Sorting in Collection – Comparable Vs Comparator interface.
 Files and I/O Streams: The file class – Stream – The Byte Streams – Filtered Byte Streams – The Random Access File Class – The character Streams.

Unit: II	GUI Applications and JDBC	12 hours
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GUI Applications: Graphical User Interface – Creating Windows – Dialog Boxes – Layout Managers – AWT components classes – Swing Component Classes – Simple Applications using AWT controls – Event Handling – other AWT components – AWT Graphics Classes – other Swing Controls – Simple Application using Swing and AWT. JDBC – Drivers – Architecture – Classes and Interfaces – Applications – working with databases.

Unit: III	Servlets and JSP	12 hours
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Servlets: Basic – Alternatives – Strengths – Architecture – Life Cycle – Generic Servlet – HTTP Servlet – Passing parameters – Cookies – Problems with servlets. JSP: Overview – JSP HTTP and Engines – Working of JSP – Anatomy of a JSP page – JSP syntax – Simple JSP page – Components of JSP – Implicit Objects.

Unit: IV	Remote Method Invocation	12 hours
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RMI: Introduction – Components of RMI – Stubs and Skeletons – Developing application with RMI – Pushing Data from the RMI server – RMI over Inter ORB Protocol (IIOP).

Unit: V	Java Bean and Enterprise Java Bean	12 hours
Java Bean: Introduction - Architecture - Life cycle - Advantages - API - Properties - Customization - Bean Info - Introspection - Bean Development Kit - Infobus - Glassgow - simple bean example. Enterprise Java Bean: Transaction process - Two tire, Three tire ,Ejb architecture-Advantages of EJB - Simple EJB example - Session Bean -Entity Bean - EJB clients.		
TEXT BOOKS		
1 <i>S.Sagayaraj, R Denis, P Karthik and D.Gajalakshmi,"Constructive Java Programming",2021, University Press. (Unit-1,Unit-2,Unit-3).</i>		
2 <i>S. Gokila, "Advanced Java Programming", Second Edition, Vijay Nicole.(Unit- 4,Unit-5).</i>		
REFERENCE BOOKS		
1 <i>Herbert Schildt, "Java the Complete Reference", Ninth Edition, Oracle Press.</i>		
2 <i>C Muthu, "Java Programming", second edition, Vijaynicole .</i>		
3 <i>Uttam K ROY, "Advanced Java Programming", Oxford University Press, 2015.</i>		
WEB REFERENCES		
1 https://lecturenotes.in/subject/368		
2 https://www.aminotes.com/2019/02/advanced-java-programming-study-material.html		
3 https://www.youtube.com/watch?v=Ae-r8hsbPUo		
4 https://www.youtube.com/watch?v=XLnimroGCIg		
5 https://www.youtube.com/watch?v=eiu2eXxeCCU&list=PLVIQHNRLfIP9OiTKTQuq3UWJNA_wOPIFr		
ASSIGNMENTS		
1 Write a program to display all the states of India and their weather information.		
2 Create a window application to display the student mark details.		
3 Write a program to illustrate the components of JSP		
4 Develop the EJB for Online Shopping		
Course Designed By		
Mr.E.Jayabalan		

MAPPING OF COURSE SPECIFIC OUTCOMES(PO)

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	S	S	M	S	S	M	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	M	M	S	M	S	M	M
CO4	S	S	M	S	M	M	S	S	M	M
CO5	S	S	M	S	M	M	S	M	M	M

S – Strong; M- Medium; L- Low

SEMESTER - III												
Course Code	21PCS11	INTERNET OF THINGS	L	T	P	C						
Core/Elective/Supportive		CORE COURSE - XI	6	0	0	5						
Pre-requisite	Knowledge on Networks and Data Communication			Academic Year 2021-2022								
COURSE OBJECTIVES:												
<ul style="list-style-type: none"> To introduce the vision of IoT from a global context. To determine the market perspectives of IoT. To understand the IoT protocols and web of things. To understand the IoT- Architecture and various applications of IoT To Acquire the problems from IOT to do research 												
SYLLABUS												
Unit : I	Introduction and Concepts			12 hours								
Introduction: Definition and Characteristics of IoT – Physical Design of IoT: Things in IoT – IoT Protocols – Logical Design of IoT: IoT Functional Blocks – IoT Communication Models – IoT communication APIs – IoT Enabling Technologies: Wireless Sensor Networks – Cloud Computing – Big Data Analytics – Communication Protocols – Embedded Systems – IoT Levels & Deployment Templates: IoT Levels (1 to 6).												
Unit : II	Domain Specific IoTs			12 hours								
Domain Specific IoTs: Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle. IoT and M2M: Introduction – M2M – Difference between IoT and M2M – Software Defined Networking for IoT – Network Function Virtualization for IoT.												
Unit : III	IoT System Management With NETCONF-YANG			12 hours								
IoT System Management With NETCONF-YANG: Need for Systems Management – Simple Network Management Protocol – Network Operator Requirements – NETCONF – YANG – IoT Systems Management with NETCONF-YANG – Developing Internet of Things: IoT Platforms Design Methodology: Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring – Motivation for Using Python.												
Unit : IV	IoT Systems – Logical Design using Python & IoT Physical Devices			12 hours								
IoT Systems – Logical Design using Python: Introduction – Installing Python – Python Data Types & Data Structures – Control Flow - IoT Physical Devices & Endpoints: What is an IoT Device? – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.												
Unit : V	Case Studies Illustrating IoT Design			12 hours								
Case Studies Illustrating IoT Design : Introduction – Home Automation: Smart Lighting - Environment: Air Pollution Monitoring – Agriculture: Smart Irrigation.												
		Total Lecture hours		60 hours								
TEXT BOOKS												
1	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on- Approach)", Reprinted, University Press, 2017											

REFERENCE BOOKS				
1	<i>Olivier Hersistent, David Boswarthick and Omar Elloumi, — "The Internet of Things - Key applications and Protocols", Wiley, 2012.</i>			
2	<i>Olivier Hersistent, Omar Elloumi and David Boswarthick, "The Internet of Things: Applications to the Smart Grid and Building Automation!", Wiley, 2012.</i>			
3	<i>Yaswant Kanetkar, Aditya Kanetkar, "Let Us Python", Second Edition, BpB Publications, 2020</i>			
WEB REFERENCES				
1	https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT			
2	https://www.ibm.com/cloud/internet-of-things			
3	https://www.iotforall.com/what-is-internet-of-things			
ASSIGNMENTS				
1	Security Threats and Vulnerabilities in IOT			
2	A Broad view on Smart City			
Case Study				
1	Implementation of IOT in Real world			
Course Designed By				
Dr.R.Pugazendi				
COURSE OUTCOMES:				
On the successful completion of the course, student will be able to:				
S.NO.	COURSE OUTCOME	BLOOMS VERB		
CO1	Understand the basic building blocks of IOT in terms of understand the physical and logical aspects of IOT	K1/K2/K3		
CO2	Demonstrate the various application areas of IOT associated with the Domain in specific and elucidate the software and network functionalities of IOT	K2/K3/K6		
CO3	Understand the management concepts of IOT and its Protocols followed by design issues and developments using Python.	K2/K3/K5		
CO4	Enhance the Knowledge on Raspberry Pi ,Linux on Raspberry Pi , Raspberry Pi Interfaces and Programming Raspberry Pi with Python -	K1/K2/K3		
CO5	Apply the knowledge on IOT to Implement the real world Applications	K3/K4/K5		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create				

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	L	L	L	M	L	M	M	M	M
CO2	S	L	L	L	S	M	L	M	M	M
CO3	M	L	M	M	M	M	M	M	M	M
CO4	M	L	L	M	M	M	M	L	S	M
CO5	M	M	M	S	S	M	S	S	S	S

S - Strong M- Medium L- Low

SEMESTER - III												
Course Code	21PCS12	MACHINE LEARNING	L	T	P	C						
Core/Elective/Supportive		CORE COURSE - XII	6	0	0	5						
Pre-requisite	Probability, Linear Algebra, Calculus and programming Languages			Academic Year 2021-2022								
COURSE OBJECTIVES:												
<ul style="list-style-type: none"> • To introduce the Basic Concepts and Techniques of Machine Learning. • To introduce the importance Probability and Statistical Tools in Machine Learning • To bring in a familiarity with Bayesian Concepts and Supervised Learning • To demonstrate important algorithmic design paradigms with Unsupervised Learning and Association Rules • To understand the impacts of Neural Networks in Machine Learning 												
SYLLABUS												
Unit : I	Introduction To Machine Learning				12 hours							
Introduction -What is Human Learning-Types of Human Learning-What is machine Learning-Types of machine Learning-Problems Not to be Solved using Machine Learning-Applications of Machine Learning-State of the Art Languages/Tools in machine Learning. Preparing to Model -Introduction-Machine Learning Activities-Basic Type of Data in Machine Learning-Exploring Structure of Data.												
Unit : II	Modeling and Evaluation				14 hours							
Modeling and Evaluation -Selecting a Model - Training a Model-Model representation and Interpretability-Evaluating Performance of a Model-Improving Performance of a Model. Brief Overview of Probability -Introduction-Importance of Statistical tools in Machine Learning-Concept of Probability- Frequentist and Bayesian Interpretation-Random Variables-Some Common Discrete Distributions-Some Common Continuous Distributions-Multiple Random Variables-Central Limit Theorem-Sampling Distributions												
Unit : III	Bayesian Concept Learning and Supervised Learning: Classification				12 hours							
Bayesian Concept Learning -Introduction-Why Bayesian Methods are Important-BAYES' Theorem-BAYES' theorem and Concept Learning- Bayesian Belief Network- Supervised Learning :Classification -Examples of Supervised Learning-Classification Model-Classification Learning Steps-Common Classification Algorithms.												
Unit : IV	Supervised Learning and Unsupervised Learning				12hours							
Supervised Learning: Regression -Example of Regression-Common Regression Algorithms. Unsupervised Learning -Introduction-Unsupervised Vs Supervised Learning-Applications of Unsupervised Learning-Clustering-Finding Pattern Using Association Rule.												
Unit : V	Neural Network				10 hours							
Basics of Neural networks -Introduction-Understanding the Biological Neuron-Exploring the Artificial Neuron-Types of Activation Functions-Early Implementations of ANN-Architectures of Neural Network-Learning Process in ANN-Back Propagation-Deep Learning.												
Total Lecture hours						60 hours						

TEXT BOOKS				
1	<i>Saikat Dutt, Subramaniyan Chandramouli, Amit Kumar Das, 2019, Machine Learning. [First Impression]. Pearson India Education Services.</i>			
REFERENCE BOOKS				
1	<i>Kevin Patrick Murphy , 2012, Machine Learning: a Probabilistic Perspective. MIT Press</i>			
2	<i>Tom M. Mitchell, 2013, Machine Learning. McGraw-Hill Education (India) Private Limited.</i>			
3	<i>Stephen Marsland, 2009, Machine Learning: An Algorithmic Perspective, CRC Press.</i>			
WEB REFERENCES				
1	https://www.tutorialspoint.com/machine_learning/index.htm			
2	https://www.mathworks.com/discovery/machine-learning.html			
3	https://www.javatpoint.com/machine-learning-algorithms			
ASSIGNMENTS				
1	Supervised Learning Vs Unsupervised Learning			
2	Pattern Recognition Using Association Rule			
Case Study				
1	Case Study on Customer Behavior: Online Shopping(Amazon/flipkart/myntra etc)			
Course Designed By				
Dr.R.Pugazendi				
COURSE OUTCOMES:				
On the successful completion of the course, student will be able to:				
S.NO.	COURSE OUTCOME	BLOOMS VERB		
CO1	Understand the basics of Machine learning	KI/K2		
CO2	Develop an appreciation for what is involved in Learning models from data	K2/K3/K4		
CO3	Understand how to evaluate models generated from data and Understand a wide variety of learning algorithms	K2/K3/K4		
CO4	Apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models	K2/K4/K5		
CO5	Understand the relationships between neural network and machine learning to solve the real world problems	KI/K2/K4		
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create				

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	M	S	S	L	M	S	S	L	M	M
CO2	M	L	M	M	L	S	S	L	L	M
CO3	M	M	S	M	M	S	M	L	L	M
CO4	S	M	M	M	L	S	S	L	L	M
CO5	M	M	L	M	L	S	S	L	L	L

S - Strong **M**- Medium **L**- Low

SEMESTER - IV				
Course Code	21PCSP5	ADVANCED JAVA - LAB	L	T
Core/Elective/Supportive		CORE PRACTICAL - V	0	2
Pre-requisite	Knowledge on Core Java		Academic Year 2021-2022	

COURSE OBJECTIVES:

- To learn how to design and develop program using advanced features.
- To build Internet based applications and standalone applications
- Design and develop GUI applications for business.

LIST OF PRACTICALS

Practical 1	Exception Handling	3 Hours
	Program to illustrate a proper way of handling exceptions.	
Practical 2	Threads	3 Hours
	Demonstrate the necessity of Thread Synchronization.	
Practical 3	Interface	3 Hours
	Demonstrate and implement interface technique.	
Practical 4	Files and I/O Stream	3 Hours
	Exhibits the file and I/O stream.	
Practical 5	AWT and Swing Components	3 Hours
	Demonstrate the AWT and Swing Components.	
Practical 6	Java Database Connectivity	3 Hours
	Exhibit the insert, delete, update and search operations in JDBC.	
Practical 7	Servlet	3 Hours
	Implement and demonstrate get() and post() methods (using Http Servlet class).	
Practical 8	Java Server Pages	3 Hours
	To implement code written in JSP.	
Practical 9	Remote Method Invocation	3 Hours
	To Implement a client/server application using RMI	
Practical 10	Java Beans and EJB	3 Hours
	Program using Java Beans and EJB.	
Total Lecture hours		30 hours
Course Designed By		
Mr.E.Jayabalan		

COURSE OUTCOMES:

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

S.NO.	COURSE OUTCOME	BLOOMS VERB
CO1	Implement the program using exception handling, threads and interface, I/O streams.	K2/K3/K4/K5
CO2	Develop programs using AWT and Swing components.	K2/K3/K4/K6
CO3	Use JDBC connectivity and create table, Insert, Delete and update data	K4/K5/K6
CO4	Understand and interact with web content.	K3/K4/K5/K6
CO5	Develop the smart application using Java beans.	K3/K4/K5/K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

MAPPING WITH PROGRAMME SPECIFIC OUTCOMES

COS	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	S	S	S	S	S	M	M	M	S	M
CO2	S	S	M	M	S	M	S	M	M	M
CO3	S	L	L	M	S	L	S	M	S	S
CO4	S	M	M	M	S	L	M	M	S	S
CO5	S	L	L	S	S	S	M	M	S	S

S - Strong **M**- Medium **L**- Low