

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

502	M.Com (CA)	Human Resources Management	21PCC415	2021
503	M. Sc. Physics	Thin Film & Nano Science	21PPS3E5	2021
504	M.A Tamil	Ikkala illakiyam	21PTM101	2021
505	M.A Tamil	Bhakthi ilakkiam	21PTM205	2021
506	M.A Tamil	Ikkala mozhiyal	21PTM208	2021
507	M.A Tamil	Tamilar Panpadu/Pechukalai	21PTM2N1/ 21PTM2N2	2021
508	M.A Tamil	Kappiyangal	21PTM310	2021
509	M.A Tamil	HTML and collaborative communication tools	21PTM313	2021
510	M.A Tamil	Thonami Ilakkiyam	21PTM414	2021
511	M.Sc. Botany	Economic Botany	21PBY1E2	2021
512	M.Sc. Botany	Elective 1-Seed technology	21PBY1E3	2021
513	M.Sc. Botany	Non- Major Elective Commercial Horticulture	21PBY1N1	2021
514	M.Sc. Botany	Elective 2-Organic forming	21PBY2E6	2021
515	M.Sc. Botany	Laboratory Course III	21PBY312	2021
516	M.Sc. Botany	Pharmacognosy	21PBY3E9	2021
517	M.Sc. Botany	Economic Botany	21PBY3N3	2021
518	M.Sc. Botany	Field/Industry/ Institute Visit	21PBYFV1	2021
519	M.Sc Computer Science	Advanced Database Management System	21PCS104	2021
520	M.Sc Computer Science	Programming Lab II:Android Programming	21PCS210	2021
521	M.Sc Computer Science	Design and Analysis of Algorithms	21PCS101	2021
522	M.Sc Computer Science	Advanced Operating System	21PCS103	2021
523	M.Sc Computer Science	Advanced Database Management System	21PCS104	2021
524	M.Sc Computer Science	Programming Lab I:Design and analysis of Algorithm	21PCS105	2021
525	M.Sc Computer Science	Elective -1: Advanced Networks	21PCS1E1	2021
526	M.Sc Computer Science	Elective -1:Wireless Network	21PCS1E2	2021

BOS HIGHLIGHTED



Dr. R. MUTHUKUMARAN,
 M.A., M.Phil., B.Ed., Ph.D.,
 PRINCIPAL
 N.G.M. College, Pollachi - 642 001
 Coimbatore District

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

527	M.Sc Computer Science	Non major Elective-1:Multimedia packages Lab	21PCS1N1	2021
528	M.Sc Computer Science	Non major Elective-1:Desktop publishing Lab	21PCS1N2	2021
529	M.Sc Computer Science	Cloud computing	21PCS207	2021
530	M.Sc Computer Science	Big data Analytics	21PCS208	2021
531	M.Sc Computer Science	Core Elective II:Software Project Management	21PCS 2E1	2021
532	M.Sc Computer Science	Core Elective II:Software engineering and Testing	21PCS 2E2	2021
533	M.Sc Computer Science	Non major Elective-II:Webdesigning Lab	21PCS2N1	2021
534	M.Sc Computer Science	Non major Elective-II:Advanced Internet	21PCS2N2	2021
535	M.Sc Computer Science	Core Elective III:Artificial Inteligence and Machine learning	21PCS 3E1	2021
536	M.Sc Computer Science	Core Elective III:Data Science	21PCS 3E2	2021
537	M.Sc Computer Science	Core Elective III:Robotics process Automation	21PCS 3E3	2021
538	M.Sc Computer Science	Non major Elective-III:Visual Basic Lab	21PCS3N1	2021
539	M.Sc Computer Science	Non major Elective-III:2D Animation Lab	21PCS3N2	2021
540	M.Com IB	Social Media Marketing	21PIB1E2	2021
541	M.Com IB	International Logistics Management	21PIB205	2021
542	M.Com IB	International Supply Chain management	21PIB2E21	2021
543	M.Com IB	World Economic Resources	21PIB2E22	2021
544	M.Com IB	Trends in E - Commerce	21PIB3E32	2021
545	M.Com IB	International Strategic Management	21PIB4E42	2021
546	MSW	Introduction to Social Work Profession	21PSW101	2021
547	B.A. History	History of Education in India	22UHY3N2	2022
548	B.A. History	Constitution of India	22UHY4N4	2022
549	B.A. English	Language and Technology Embeded Creation	22UEL306	2022
550	B.A. English	Drama II	22UEL407	2022
551	B.A. English	Elective I : English for Media	22UEL5E11	2022
552	B.A.Economics	Core III: Disaster Management	22UEO2A2	2022

Metric : 1.2.1



New Course Introduced

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DEPARTMENT OF COMPUTER SCIENCE
NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
(AUTONOMOUS)

Re-Accredited by NAAC and 9001 : 2015 Certified Institution
Ranked 72nd among Colleges in India by MHRD - NIRF
Affiliated to Bharathiar University, Coimbatore
POLLACHI – 642 001



Meeting of the Board of Studies in Computer Science

Date : 22ND MAY 2021

Venue : ONLINE – MICROSOFT TEAMS

Day : Saturday

Time : 10.00 A.M.

The Meeting of the Board of Studies in Computer Science – UG was held on Saturday, 22nd May 2021 at 10.00 a.m through online mode – Microsoft Teams.

OFFICIAL AGENDA

1. The Syllabi and scheme of Examinations for UG Degree BSc. Computer Science Academic Year 2021 -24 was presented for discussion and scrutiny by the respective course teachers.
2. The continuous Assessment programme for the candidates admitted during the Academic Year 2021 -24 were revised as per the recommendations of the affiliating university – Bharathiar University.
3. The Panel of Examiners for theory and practical Examinations were prepared.
4. The Academic Auditor has presented the outcome of the Academic Audit.
5. The Course Outcome (CO) and Programme Outcome (PO) Mapping and Creation of Rubrics were recorded in each course as per the instructions from the Curriculum Development Council of NGM College.

Members Present

Chairman
1. Dr. Antony Selvadoss Thanamani, Associate Professor & Head, NGM College, Pollachi
Members & External Experts
2. Dr.A.Geetha, Associate Professor and Head, PG and Research, Department of Computer Science, Chikkanna Govt arts college Tirupur. geethagac07@gmail.com . 9442919607. (Subject Expert)
3. Dr. K Karthikeyan, Associate Professor and Head, Department of Computer Science,

Puratchi Thalaivi Amma Government Arts and Science College Palladam,
gackarthi73@gmail.com 9842272503. **(Subject Expert)**

4. Aarthy Thiagarajan, Toshiba Software India Pvt Ltd, Bangalore. 9952812013. **(Industrial Expert)**
5. Rishop Babu, Optisol Business solutions, Chennai. **(Industrial Expert)**
6. Dr.S.Kanchana Associate Professor Department of Computer Science, SRM Institute of Science & Technology, Kattankulathur, Chennai. Ph: 94444 68583 **(Academic Auditor)**
7. Dr. N. Raveendran, Scientist 'F', National Informatics Centre, New Delhi **(Alumini)**
8. Dr. R.Manicka Chezian, Associate Professor, NGM College, Pollachi
9. Thiru. K.Srinivasan, Associate Professor, NGM College, Pollachi
10. Dr. Aruchamy Rajini, Assistant Professor, NGM College, Pollachi
11. Ms. M. Malathi, Assistant Professor , NGM College, Pollachi
12. Dr. M. Sakthi, Associate Professor & Head (Self-Financing) , NGM College, Pollachi
13. Dr. R. Nandhakumar, Assistant Professor, NGM College, Pollachi
14. Dr. R. Deepa, Assistant Professor, NGM College, Pollachi
15. Mrs. M. Dhavapriya, Assistant Professor, NGM College, Pollachi
16. Mrs S.Sharmila, Assistant Professor , NGM College, Pollachi
17. Mrs. N. Yasodha, Assistant Professor, NGM College, Pollachi
18. Mrs. M. Meena Kritihika, Assistant Professor, NGM College, Pollachi
19. Mrs. S. Shanthi, Assistant Professor, NGM College, Pollachi
20. Mr. N. Arul kumar, Assistant Professor, NGM College, Pollachi
21. Mr. N.Karthikeyan, Assistant Professor, NGM College, Pollachi
22. Dr. A. Kanagaraj, Assistant Professor, NGM College, Pollachi
23. Mrs. P.Jayapriya, Assistant Professor, NGM College, Pollachi
24. Mrs. S. Vallinayagam, Assistant Professor, NGM College, Pollachi
25. Mr. A.Muruganandham, Assistant Professor, NGM College, Pollachi

** BOS held through online mode hence no individual signatures were obtained


Chairman


Principal

ANNEXURE I

Minutes of the 10th Meeting – Action Taken Report

S.No	Suggestion given by expert members	Action taken
1	Included case studies in Design and Analysis of Computer Algorithms	Reviewed and Implemented
2	Included NoSQL concepts in Advanced Database Management System	Implemented
3	Introduced Big Data Analytics as a new paper	Implemented
4	Introduced Cloud Computing as a new paper	Implemented
5	Data Science	Implemented
6	AI & Machine Learning has been introduced in Elective-III	Implemented



HoD

Dr. M. SAKTHI, M.Sc., M.Phil., Ph.D.,
Associate Professor & Head
PG Department of Computer Science
NGM College, Pollachi - 642 001.

**List of Courses having focus on local, national, regional and global developmental needs
offered by the M.Sc Computer Science**

PG COMPUTER SCIENCE						
Programme: M.Sc					Year: 2021	
Course Code	Course Title	Need				Rationale
		Local	National	Regional	Global	
21PCS101	Design & Analysis of Algorithms	✓				It also helps to design and analyze the logic on how the program will work before developing the actual code for a program
21PCS102	Data Mining and Warehousing		✓			extract valuable information from available data, uncovering patterns and finding anomalies and relationships in large datasets
21PCS103	Advanced Operating System		✓			an operating system can manage how to divide the program so that it runs on more than one processor at a time
21PCS104	Advanced Database Management System				✓	provides a centralized view of data that can be accessed by multiple users, from multiple locations, in a controlled manner
21PCS206	Android Programming				✓	may need to address business requirements or build new services or businesses, or they may want to offer games and other types of content for users
21PCS207	Cloud Computing				✓	provides flexible resource allocation on demand with the promise of realizing elastic, Internet-accessible, computing on a pay-as-you-go basis.
21PCS208	Big Data Analytics				✓	leads to smarter business moves, more efficient operations
21PCS209	Advanced		✓			provides libraries to understand the concept of Client-Server

	Java Programm ing					architecture for web- based applications
21PCS311	Internet of Things				✓	have devices that self report in real-time, improving efficiency and bringing important information to the surface more quickly than a system depending on human intervention.
21PCS312	Network Security & Cryptogra phy				✓	a stable and efficient network security system is essential to protecting client data
21PCS313	Python Programm ing				✓	most accessible programming langua ges available because it has simplified syntax
21PCS314	Digital Image Processing		✓			Extract from an image quantitative information that is not readily apparent to the eye, and to calibrate an image in photometric or geometric terms
21PCS1E1	Advanced Networks		✓			enriches our understanding of phenomena such as riots, violence, and social and biological epidemics
21PCS2E1	Software Project Managem ent	✓				important role in an organization by giving insights into project progress, performance, and inventory tracking
21PCS3E1	Artificial Intelligenc e & Machine Learning				✓	makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks
21PCS3E2	Data Science				✓	Uses various statistical techniques to analyze and draw insights from the data. From data extraction, wrangling and pre-processing, a Data Scientist must scrutinize the data thoroughly

21PCS2P1	Pilot Project – I				✓	enables to manage the risk of a new idea and identify any deficiencies before substantial resources are committed
21PCS4P2	Project Work and Viva-Voce				✓	explore the various functional areas and analyze how theoretical concepts taught are applied in real life situations

M. Sakthi

HoD

Dr. M.SAKTHI, M.Sc., M.Phil. (C.S.),
Associate Professor & Head

PG Department of Computer Science
NGM College, Pollachi - 642 002

[Signature]
Principal

List of Courses having focus on employability/ entrepreneurship/ skill development offered by the M.Sc Computer Science

PG COMPUTER SCIENCE						
Programme: M.Sc					Year:2021	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
21PCS101	Design & Analysis of Algorithms			✓	Algorithm Design	2010
21PCS102	Data Mining and Warehousing	✓			Server Administration	2010
21PCS103	Advanced Operating System	✓			Operating System Cert/Qual Engineer	2010
21PCS104	Advanced Database Management System	✓			Database Management	2018
21PCS206	Android Programming		✓		Android Developer	2014
21PCS207	Cloud Computing			✓	Cloud Administrator	2020
21PCS208	Big Data Analytics	✓			Data Architect	2016
21PCS209	Advanced Java Programming			✓	Java Web Developer	2014

21PCS311	Internet of Things		✓		Iot Architect	2017
21PCS312	Network Security & Cryptography		✓		Cyber Security Engineer	2018
21PCS313	Python Programming			✓	Python Developer	2019
21PCS314	Digital Image Processing			✓	Image Processing Engineer	2013
21PCS1E1	Advanced Networks	✓			Network Architect	2010
21PCS2E1	Software Project Management	✓			Project Developer	2021
21PCS3E1	Artificial Intelligence & Machine Learning		✓		Ai Data Analyst Machine Learning Engineer	2021
21PCS3E2	Data Science	✓			Data Scientist	2021
21PCS2P1	Pilot Project – I		✓		Android App Developer	2015
21PCS4P2	Project Work and Viva-Voce		✓		Software Developer	2010

S.No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
1	21PCS104	Advanced Database Management System	Unit - III, Unit-IV, Unit-V	60%	Transaction processing, Concurrency control techniques, MongoDB, Neo4j.	Advanced SQL, NoSQL, Hybrid SQL	Subject Expert
2	21PCS206	Android Programming	Unit-V	10%	Nil	Unit-V: Case Study: Android Operating System- Architecture, Security Challenges and Solutions.	Subject Expert
3	21PCS210	Programming Lab II: Android Programming		50%	Programs for separate UI controls were removed.	Programs for applications are newly added.	Subject Expert
4	21PCS101	Design & Analysis of Algorithms	Unit-V	20%	0/1 Knapsack problem – LC Branch and Bound solution – FIFO Branch and Bound solution – Traveling salesperson	Case study: Activity or Task Scheduling Problem- Median of the two sorted arrays- Sudoku	Subject Expert
5	21PCS103	Advanced Operating System	New	100%	New	New	Subject Expert / Course Teacher
6	21PCS104	Advanced Database Management System	Unit - III, Unit-IV, Unit-V	60%	Transaction processing, Concurrency control techniques, MongoDB, Neo4j.	Advanced SQL, NoSQL, Hybrid SQL	Subject Expert
7	21PCS105	Programming Lab I: Design & Analysis of Algorithms	Programs	20%	Basic Programs were removed.	New programs are added.	Subject Expert
8	21PCS1E1	Elective – I Advanced Networks	Unit-V	20%	MIME	Unit-V : Case Study - TCP/IP framework case study	Subject Expert / Course Teacher
9	21PCS1E2	Elective – I Wireless Networks	New	100%	New	New	Course Teacher
10	21PCS1E3	Elective – I Mobile Computing	Unit-V	10%	Nil	Unit - V: Wireless Devices with Windows CE: Different Flavors of Windows CE – Windows CE Architecture.	Course Teacher
11	21PCS1N1	Non-Major	New	100%	New	New	CDC

		Elective I : Multimedia Packages Lab					instructions NME is introduced
12	21PCS1N2	Non-Major Elective I : Desktop Publishing Lab	New	100%	New	New	CDC instructions NME is introduced
13	21PCS207	Cloud Computing	New	100%	New	New	Subject Expert/Univers ity Nominee
14	21PCS208	Big Data Analytics	New	100%	New	New	Subject Expert
15	21PCS2E1	Elective – II Software Project Management	New	100%	New	New	Subject Expert
16	21PCS2E2	Elective – II Software Engineering and Testing	New	100%	New	New	Subject Expert
17	21PCS2N1	Non Major Elective II: Web Designing Lab (General Supportive - II)	New	100%	New	New	CDC instructions NME is introduced
18	21PCS2N2	Non Major Elective II: Advanced Internet Technologies Lab	New	100%	New	New	CDC instructions NME is introduced
19	21PCS312	Network Security & Cryptograph y	Unit III,Unit V	15%	one Topic	Key Cryptosystems: Pseudorandom Number Generation Based on an Asymmetric Cipher.	Course Teacher
20	21PCS313	Python Programmin g	Title, Unit-IV , Text Books	10%	Nil	Data Ploting and VizualizationTechniqu es	Course Teacher
21	21PCS3E1	Elective-III Artificial Intelligence & Machine Learning	New	100%	New	New	Subject Expert/Univers ity Nominee

22	21PCS3E2	Elective-III Data Science	New	100%	New	New	New Subject based on Current Needs
23	21PCS3E3	Elective-III Robotic Process Automation for Business	New	100%	New	New	New Subject based on Current Needs
24	21PCS3N1	Non Major Elective III: Visual Basic Lab (General Supportive - III)	New	100%	New	New	CDC instructions NME is introduced
25	21PCS3N2	Non Major Elective III:2D Animation Lab.	New	100%	New	New	CDC instructions NME is introduced

M. Sankar

HoD

Dr. M.SAKTHI, M.Sc., M.Phil., Ph.D.,

Associate Professor & Head

PG Department of Computer Science

NGM College, Pollachi - 642 001.

Srinivasan
Principal

M. Sankar

HoD

Dr. M.SAKTHI, M.Sc., M.Phil., Ph.D.,

Associate Professor & Head

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Srinivasan
Principal

Percentage of Revision of B.Sc. Computer Science

Syllabus Revised for the Academic Year – 2021-2022

B.Sc. Computer Science (SF)							
S.No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
1	21UCS101	Core I: Programming in C and C++	2 Course Merged C and C++ (Course Code: 20UCS101 and 20UCS201)	100%	20UCS101: Exception Handling	Full Syllabus	Basic Languages
2	21UCS1A2	Allied-1: Advanced Mathematics and Applied statistical	Newly updated	100%	NIL	Full Syllabus	Base on Current scenario
3	21UCS103	Core Lab I: Programming Lab in C and C++	Newly updated	100%	NIL	As per changes made in theory 21UCS101	Based On theory Syllabus
4	21UCS204	Core III: Java Programming	Syllabus moved from III Semester to II Semester	NIL	NIL	NIL	Based on changes carried in the previous semester
5	21UCS2A2	Allied-2: Discrete Mathematical Structure Level-II	Newly updated	100%	NIL	Full Syllabus	Base on Current scenario
6	21UCS206	Core Lab II: Programming Lab in Java	Syllabus moved from III Semester to II Semester	NIL	NIL	NIL	Based on changes carried in the previous semester
7	21UCS307	Core V: .NET Technologies	Full	100%	NIL	Full Syllabus	Base on Current technology
8	21UCS309	Core VII: System Software and Operating System	Unit I and Unit II	40%	NIL	System software Content Added	Based on decision made in BOS

9	21UCS310	Core Lab III: Programming Lab in .NET Technologies	Full	100%	NIL	Full Syllabus	Base on Current technology
10	21UCS517	Core XI: Linux and Shell Programming	Socket Programming introduced	20%	NIL	Networking Concepts introduced in Linux	Suggestion given by committee members in BOS
11	21UCS520	Core Lab VII: Linux: shell and Socket Programming Lab	Socket Programming introduced	20%	NIL	Networking Concepts introduced in Linux	Changes made in theory- 21UCS517.
12	21UCS5E2	Data Engineering with Google Cloud	Full	100%	NIL	Full Syllabus	Base on Current technology
13	21UCS5E3	Mobile Application Development	Full	100%	NIL	Full Syllabus	Base on Current technology
14	21UCS6E4	Core Elective – II :Artificial Intelligence and Machine Learning	Full	100%	NIL	Full Syllabus	Base on Current technology
15	21UCS6E5	Core Elective – II :Front End Development with React	Full	100%	NIL	Full Syllabus	Base on Current technology
16	21UCS6E6	Core Elective – II :MongoDB	Full	100%	NIL	Full Syllabus	Base on Current technology
17	21UCS6E7	Core Elective – III :Information Retrieval	Full	100%	NIL	Full Syllabus	Base on Current technology

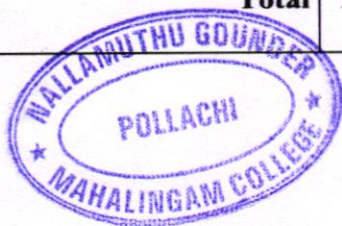
18	21UCS6E8	Core Elective – III :HTML,JavaScript and JQuery for Web Designing	Full	100%	NIL	Full Syllabus	Base on Current technology
19	21UCS6E9	Core Elective – III :Angular NodeJS	Full	100%	NIL	Full Syllabus	Base on Current technology


Chairman


Principal

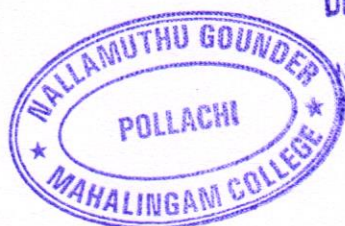
SCHEME OF EXAMINATION

Course Code	Course Title	Hours		Examination				
		Theory	Practical	Hours	CIA	ESE	Total	Credits
I SEMESTER								
21PCS101	Design & Analysis of Algorithms	4	-	3	50	50	100	4
21PCS102	Data Mining and Warehousing	5	-	3	50	50	100	5
21PCS103	Advanced Operating System	4	-	3	50	50	100	4
21PCS104	Advanced Database Management System	2	4	3	50	50	100	4
21PCS105	Programming Lab I: Design & Analysis of Algorithms	-	4	3	50	50	100	3
21PCS1E1	Elective I: Advanced Networks	5	-	3	50	50	100	5
21PCS1E2	Elective I: Wireless Networks							
21PCS1E3	Elective I: Mobile Computing							
Total		20	08		300	300	600	25
II SEMESTER								
21PCS206	Android Programming	4	-	3	50	50	100	4
21PCS207	Cloud Computing	4	-	3	50	50	100	4
21PCS208	Big Data Analytics	3	2	3	50	50	100	4
21PCS209	Advanced Java Programming	2	4	3	50	50	100	4
21PCS210	Programming Lab II: Android Programming	-	3	3	50	50	100	3
21PCS2E1	Elective II: Software Project Management	4	-	3	50	50	100	4
21PCS2E2	Elective II: Software Engineering and Testing							
21PCS2E3	Elective II: Object Oriented Analysis and Design with UML							
21PCS2P1	Pilot Project – I	-	2	-	50	50	100	2
21PCS2N1/ 21PCS2N2	Non Major Elective I: Web Designing Lab/ Advanced Internet Technologies Lab	-	2	2	25	25	50	2
Total		17	13		375	375	750	27



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Course Code	Course Title	Hours		Examination				
		Theory	Practical	Hours	CIA	ESE	Total	Credits
III SEMESTER								
21PCS311	Internet of Things	4	-	3	50	50	100	4
21PCS312	Network Security & Cryptography	4	-	3	50	50	100	4
21PCS313	Python Programming	2	4	3	50	50	100	4
21PCS314	Digital Image Processing	4	-	3	50	50	100	4
21PCS315	Programming Lab III: Internet of Things	-	3	3	50	50	100	3
21PCS316	Programming Lab IV: Digital Image Processing using MATLAB	-	4	3	25	25	50	2
21PCS3E1	Elective III: Artificial Intelligence & Machine Learning	5	-	3	50	50	100	5
21PCS3E2	Elective III: Data Science							
21PCS3E3	Elective III: Robotic Process Automation for Business							
Total		19	11		325	325	650	26
IV SEMESTER								
21PCS4P2	Project Work and Viva-Voce	-	3	-	100	100	200	12
GRAND TOTAL							2200	90



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# CO-SCHOLASTIC COURSES					Grade/ Credit
	Teaching Hours	CIA	ESE	TOTAL	
ONLINE COURSES					
Swayam, MOOC Course etc.,	-	-	-	-	Grade
VALUE ADDED COURSES					
Value Added Courses	30	25	25	50	2
CERTIFICATE COURSE					
Certificate Course	30	-	-	-	2
ADVANCED LEARNER COURSE					
Advanced Learner Course	30	-	-	-	Grade
The scholastic courses are only counted for the final grading and ranking. However for the award of the degree, the completion of co-scholastic one online course is mandatory. All other co-scholastic courses are optional only.					

1	Semester I	#SWAYAM/ MOOC	Any Online Course (Compulsory)
2	Semester III	#Value Added Course	Block Chain and Cryptocurrency/ Digital Entrepreneurship (Compulsory)
3	Any Semester	#Certificate Course	Software Testing Lab– Selenium (Optional)
4	Any Semester	#Advanced Learner Course	User Interface Design Lab – Figma (Optional)



[Signature]
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Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS101	Course Title:	Design & Analysis of Computer Algorithms		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	4

Course Objective

To prepare the students for a job in industry and to learn the systematic way of solving the problems using data structures and algorithms.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember and Understand the concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation	K1
CO2	Identify the key characteristics of a given problem and analyse the suitability of a specific algorithm design technique for the problem.	K2
CO3	Apply important algorithmic design paradigms and methods of analysis.	K3,K4
CO4	Analyze major graph algorithms and to employ graphs to model engineering problems	K4,K5
CO5	Analyze worst-case running times of algorithms using various algorithms	K5

MAPPING

PQ/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	H	H	H	M	H	H	M
CO2	H	M	M	H	H	H	M	M	H	H	M	H	H	H	M
CO3	H	H	H	M	M	H	H	H	M	M	M	H	H	M	H
CO4	M	H	M	H	M	M	H	M	H	M	H	M	H	H	M
CO5	M	H	H	H	M	M	H	H	H	M	H	H	M	M	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction: Algorithm definition and specification – Performance Analysis –Elementary Data structures:- Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint set-Union – Graphs – Basic traversal and search techniques – Techniques for Binary Tree – Techniques for Graphs: Breadth First Search and Traversal, Depth First Search and Traversal.	11
UNIT II	Divide – and – Conquer: - General method – Binary search – Merge sort – Quick sort –The Greedy method: - General method – Knapsack problem – Minimum cost spanning tree –Single source shortest path.	12
UNIT III	Dynamic Programming: General method – Multistage graphs – All pair shortest path –Optimal binary search trees – 0/1 Knapsack – Traveling salesman problem – Flow shop scheduling.	12
UNIT IV	Backtracking: General method – 8-Queens problem – Sum of subsets – Graph coloring – Hamiltonian cycles – Knapsack problem.	12

UNIT V	Branch and bound: The method – Least Cost (LC) Search – The 15 puzzle: An Example – Control abstractions for LC Search – Bounding – FIFO Branch and Bound – LC Branch and Bound. Case study: Activity or Task Scheduling Problem- Median of the two sorted arrays- Sudoku.				13
	Total Contact Hours				60
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.					
Text Book					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION	
1	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran	Design and Analysis of Computer Algorithms	2 nd Edition, Galgotia Publications	2008	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION	
1	Ellis Horowitz, Sartaj Sahni	Fundamentals of data structures	Reprinted Edition, Galgotia Publications	2015	
2	Alfred V.Aho, John E.Hopcroft& Jeffery D Ullman	Data structures and Algorithms	Reprinted Edition , PHI learning PVT Ltd	2009	
3	Adam Drozdek	Data Structures and Algorithms in C++	4 th Edition, Vikas publishing house, New Delhi	2012	
Web References 1. https://onlinecourses.nptel.ac.in/noc21_cs22/preview 2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/analysis_of_algorithms.htm 3. https://www.javatpoint.com/daa-tutorial 4. http://cs.uef.fi/pages/franti/asa/notes.html 5. https://vssut.ac.in/lecture_notes/lecture1428551222.pdf					

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: S.Sharmila	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:	M.Sc CS	Programme Title:	Master of Science (Computer Science)
Course Code:	21PCS103	Course Title:	Advanced Operating Systems
Lecture Hrs./Week Or Practical Hrs./Week	4	Tutorial Hrs/Sem	-
		Batch :	2021-2023
		Semester:	I
		Credits:	4

Course Objective

To understand the concepts of operating system, distributed operating systems, real time operating systems, operating system for handheld systems, LINUX OS and iOS.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the basic concepts of Operating Systems and its applications.	K1
CO2	Understand the advanced concepts in operating system, the concepts of distributed operating systems, the information about Linux operating system and iOS architecture, layers and its functions.	K2
CO3	Apply different Operating Systems	K3
CO4	Analyze deadlock situations, the reason for deadlock, recovery of deadlocks, how to avoid deadlocks, the need for Real time operating system and security issues.	K4
CO5	Evaluate the use of Palm OS and Android in handheld devices.	K5

MAPPING

PQ/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	L	L	M	H	H	M	H	H	H	M	L	L	M
CO2	H	M	M	M	L	H	M	M	H	H	H	M	M	M	L
CO3	H	M	M	L	M	H	H	H	M	M	H	L	L	M	M
CO4	H	H	H	L	M	M	H	M	H	M	H	H	H	L	L
CO5	H	L	M	L	M	M	H	H	H	M	H	L	M	L	M

H: High; M: Medium; L: Low

Units	Contents	Hrs
UNIT I	Process Synchronization : Overview : Introduction – Functions of an operating system – Design approaches – Why Advanced Operating Systems – Types of Advanced Operating Systems - Synchronization Mechanisms : Introduction – Concept of a Process – Concurrent Processes – The Critical Section Problem – Other Synchronization Problems - Process Deadlocks : Introduction – Preliminaries – Models of Deadlocks.	12
UNIT II	Distributed Operating Systems :Issues in Distributed Operating Systems – Communication Primitives – Theoretical Foundation : Lamport's Logical Clocks – Distributed Deadlock. Detection : Deadlock Handling Strategies in Distributed Systems – Issues in Deadlock Detection and Resolution- Distributed File Systems : Design Issues.	12
UNIT III	Real Time Operating Systems :Introduction – Applications of Real Time Systems – Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling.	12
UNIT IV	Operating Systems for Handheld Systems : Handheld Systems – The requirements – Technology	12

	Overview – Handheld Operating Systems – PalmOS–Symbian OS - Google Android- Securing Handheld Systems.				
UNIT V	Linux and iOS: Linux : Introduction – Linux Kernel Architecture - Process Management and Linux Scheduler : Process management - Process Scheduling – Linux Inter-Process Communication–Linux Memory management–Linux File Systems – iOS: Architecture and SDK Framework - Media Layer -Services Layer - Core OS Layer. Case study – An example iOS 4 iphone camera application.				12
	Total Contact Hours				60
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.					
Text Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	MukeshSinghal and Niranjan G. Shivaratri. (Units– I &II)	Advanced Concepts in Operating Systems –Distributed , Database and Multiprocessor Operating Systems	Tata McGraw-Hill Publishers	2017	
2	Rajib Mall (Unit –III)	Real-Time Systems: Theory and Practice	Pearson Education India Publishers , First Edition	2009	
3	Pramod Chandra P.Bhatt, (Unit – IV & Unit –V)	An Introduction To Operating Systems : Concepts And Practice (GNU / Linux)	PHI Learning Pvt Ltd., Fourth Edition	2019	
4	Neil Smyth. (Unit –V)	iPhone iOS 4 Development Essentials – Xcode	Payload media Publishers, Fourth Edition	2011	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	YoonSeokPyo,HanCheol Cho,RyuWoonJung,	ROS Robot Programming from the basic concept to practical	Robotics Co., Ltd., Tae Hoon Lim	2017	
2	Andrew S. Tanenbaum	Modern Operating System Programming and Robot Application	Prentice – Hall, Inc, Third Edition	2008	
3	Anis Koubaa	Robot Operating Systems (ROS): The Complete Reference (Volume I)	Springer Publishers, First Edition	2016	
Web References					
1. http://nptel.ac.in/courses/Webcourse-contents/IIScBANG/Operating%20Systems/New_index1.html					
2. https://www.tutorialspoint.com/operating_system/index.htm					
3. https://www.coursera.org/courses?languages=en&query=operating+system					
4. https://in.udacity.com/course/advanced-operating-systems--ud189					
5. http://wiki.ros.org/ROS/Tutorials					
6. https://www.toptal.com/robotics/introduction-to-robot-operating-system .					

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: S.S.Shanthi	Name: Dr.M. Sakthi	Name: K.Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS104	Course Title:	Advanced Database Management System		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		6	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	4

Course Objective

To improve the knowledge of database management system and effectively demonstrate the key concepts of advanced SQL and NoSql.

Course Outcomes(CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember and Understand the design and creation of tables in databases.	K1
CO2	Understand Relational data model and design theory with different indexing structures and physical databases.	K2
CO3	Remember and Apply advanced SQL, Sub-queries, embedded and dynamic SQL.PL/SQL concepts with triggers.	K1,K4
CO4	Analyze the history of NoSql with features, DB design, Applying consistency methods, Evaluating keys.	K4,K5
CO5	Ability to understand features of Document database, Hybrid NoSql.	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	H	H	H	H	H	M	M	H	H	H	H	M	M	L
CO2	M	M	H	H	H	M	M	M	H	H	H	H	M	L	M
CO3	M	H	H	H	M	H	H	H	M	H	M	M	H	M	M
CO4	M	H	M	M	H	M	H	M	H	M	H	H	H	H	H
CO5	H	H	M	M	H	M	H	H	H	M	H	H	H	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction: Purpose of Database Systems -View of Data -Database Languages -Data Storage and Querying-Transaction Management –Storage Management –Data Mining and Information Retrieval-Specialty Databases -Database Users and Administrators. Relational Databases: Introduction to the Relational Model -Structure of Relational Databases-Database Schema -Keys-Schema Diagrams-Relational Query Languages-Relational Operations	18
UNIT II	Database Design Theory: Indexing Structures for Files and Physical Database Design: Types of Single-Level Ordered Indexes - Multilevel Indexes - Dynamic Multilevel Indexes Using B-Trees and B+-Trees Indexes on Multiple Keys - Other Types of Indexes –	18

	Some General Issues Concerning Indexing - Physical Database Design in Relational Databases.			
UNIT III	Advanced SQL: Constraints- SQL CREATE INDEX- SQL functions-The GROUP BY statement- The HAVING clause- SQL special functions- SQL alias- SQL join – Sub queries- Recursive queries-Data control language-Views and assertion- PL/SQL- a basic introduction-Triggers- Event condition action model-Functions and procedures-Embedded SQL and dynamic SQL- The java way to access RDBMS: JDBC- SQLJ	18		
UNIT IV	Introduction of NoSQL: A brief history of NoSql- features of NoSql. NoSql Database design: Managing different data types, Describing noSql - Applying consistency methods-Acid,base. Developing applications on NoSql, Evaluating NoSql -Technical ,Businessevaluation. Key-Value Stores: Common Features of Key-Value Stores,Key-Value Stores in the Enterprise,Key-Value Use Cases, Key-Value StoreProducts.	18		
UNIT V	Document Database and Hybrid NoSQL: Common Features of Document Databases- Document Databases in the Enterprise- Document Database Use Cases- Document Database Products. Hybrid NoSQL Databases: Common Hybrid NoSQL Features- Hybrid Databases in the Enterprise- Hybrid NoSQL Database Use Cases, Hybrid NoSQL DatabaseProducts.	18		
	Total Contact Hours	90		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	RiniChakrabarti, ShilbadraDasgupta, Subhash K. Shinde	Advanced Database Management System	KLSI, Dreamtech press	2014
2	Raghu Ramakrishnan, Johannes Gehrke	Database Management Systems	McGraw Hill, Third Edition	2004
3	RamezElmasriandS hamkantB.Navathe	Fundamentals of Data base systems	7 th Edition	2017
4	John Wiley and adam fowler	NoSQL For Dummies	1st Edition, Kindle Edition	2015
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Silberschatz, H.Korthand S.Sudarshan	Database System Concepts	6 th Edition	2011
2	Hector Garcia-Molina , Jeffrey D.Ullman, Jennifer Widom	Database System: The Complete Book	7 th Edition	2019
3	Henry F Korth, Abraham Silberschatz, S. Sudharshan	Database System Concepts	5 th Edition, McGraw Hill	2016
4	<u>Gerardus Blokdyk</u>	NoSQL Databases A Complete Guide	2020 Edition	2019
Web References				
1. https://www.w3schools.in/dbms/database-normalization/				
2. https://www.guru99.com/indexing-in-database.html				

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS105	Course Title:	Programming Lab I: Design & Analysis of Algorithms		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	3

Course Objective

To deal with a wide variety of computational problems and to provide a thorough knowledge of the most common algorithms and data structures.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand problems by applying appropriate algorithms.	K3
CO2	Analyze the efficiency of various algorithms.	K4
CO3	Apply various data structure techniques to solve problems.	K4
CO4	Solve a program in many ways using different techniques.	K4,K5
CO5	Identify and evaluate complex problems using principles of mathematics and engineering science.	K5

MAPPING

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	H	M	H	M	H	H	M	H	H	H	M	H	H	H
CO2	H	M	M	H	L	H	M	M	H	H	H	M	H	M	M
CO3	M	H	M	H	M	H	H	H	M	H	M	M	M	M	H
CO4	H	H	H	M	H	M	H	M	H	M	H	M	H	H	M
CO5	H	M	M	H	H	M	H	H	H	M	H	H	H	M	H

H: High; M: Medium; L: Low.

Contents	Hrs
1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements	7
2. Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements	
3. Implement a 0/1 Knapsack problem using Dynamic Programming.	8
4. Obtain the Topological ordering of vertices in a digraph	
5. In a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	8
6. Print all the nodes reachable from a starting node in a digraph using BFS method.	
7. Find Minimum Cost Spanning Tree of a undirected graph using Kruskal's algorithm	8
8. Find Minimum Cost Spanning Tree of a undirected graph using Prim's algorithm	

9. Check whether a given graph is connected or not using DFSmethod	8	
10. Find a subset of a given set $S = \{s_1,s_2,.....,s_n\}$ of n positive integers whose sum is equal to a given positive integer d. For example, if $S=\{1, 2, 5, 6, 8\}$ and $d = 9$		
11. Implement N Queen's problem using BackTracking	10	
12. Implement All-Pairs Shortest Paths problem using Floyd'salgorithm		
13. Implement Travelling Sales Person problem using Dynamicprogramming.	11	
14. Design and implement the presence of Hamiltonian Cycle in an undirected Graph G of nvertices		
	Total Contact Hours	60

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran	Design and Analysis of Computer Algorithms	2 nd Edition, Galgotia Publications	2008
2	Anany Levitin	Introduction to the Design and Analysis of Algorithms	Pearson Education, Delhi, 2nd Edition	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni	Fundamentals of data structures	Reprinted Edition, Galgotia Publications	2015
2	Adam Drozdek	Data Structures and Algorithms in C++	4 th Edition, Vikas publishing house, New Delhi	2012

Web References

1. https://iare.ac.in/sites/default/files/lab1/II%20YEAR_DAA_LAB_MANUAL.pdf
2. <http://camelliait.ac.in/Lab%20Manual/ADA%20Lab%20Programs.pdf>
3. <http://www.anuraghyd.ac.in/cse/wp-content/uploads/sites/10/DAA-through-Java-Lab.pdf>
4. <https://www.ahirlabs.com/practicals/design-analysis-of-algorithms-lab-practical/>
5. https://www.cet.edu.in/noticefiles/278_DAA%20Complete.pdf

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: S.Sharmila	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS1E1	Course Title:	Elective I:Advanced Networks		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	5

Course Objective

To gain depth knowledge of Transmission protocol/Internet protocols and their functionalities.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect OSI and TCP/IP layers and their tasks. Interpret and explain physical, logical and port addresses.	K1
CO2	Comprehend Standard Ethernet and Mapping techniques.	K2
CO3	Deploy Logical addressing and discuss the format of IPv4 and IPv6 addresses	K3
CO4	Analyze the problems and solutions associated with delivery and forwarding of packets	K4
CO5	Present knowledge on Mobile IP and Client-Server interactions	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	H	H	H	M	H	H	H
CO2	H	M	H	M	H	H	M	M	H	H	H	M	M	M	H
CO3	H	M	H	M	H	H	H	H	M	M	M	H	M	H	H
CO4	H	H	M	M	M	M	H	M	H	M	M	H	H	M	M
CO5	H	H	H	M	M	M	H	H	H	M	M	H	H	M	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction and overview: TCP/IP internet, Internet Service: Application Level, Network Level. Network Technologies: Two Approaches To network Communication-Wide Area and Local Area Networks-Hardware addressing scheme, Ethernet (IEEE802.3), WiFi (IEEE 802.11), ZigBee (IEEE802.15.4) Internetworking Concept and Architectural Model - Protocol Layering	14
UNIT II	Internet Addressing - Mapping Internet Addresses to Physical Addresses (ARP) - Internet Protocol : Connectionless Datagram Delivery(IPV4 , IPV6)	15
UNIT III	Internet Protocol: Forwarding IP Datagram's - Internet Protocol: Error and Control Messages (ICMP) - User Datagram Protocol(UDP)	15
UNIT IV	Reliable Stream Transport Service (TCP): Needs-properties-Reliability-Sliding Window paradigm-TCP Layering, ports, connection and end points-passive and active open-segments, streams and sequence number-variable window size and flow control-TCP segment format, options, checksum, acknowledgment, retransmission and timeouts. Routing among Autonomous Systems (BGP) - Label Switching , Flows , and MPLS - Packet Classification	16

UNIT V	Network Visualization - Bootstrap And Auto configuration (DHCP , NDP , IPv6 – ND) Electronic Mail (SMTP, POP, IMAP): Introduction -Electronic Mail-Mailbox Names And Aliases-Alias Expansion And Mail Forwarding-TCP/IP Standards For Electronic Mail Service-Simple Mail Transfer Protocol (SMTP)-Mail Retrieval And Mailbox Manipulation Protocols. Case Study: TCP/IP Framework Case Study- Communication, Internet, Infrastructure and Development.	15
	Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Douglas E. Comer	Internetworking with TCP/IP Principles, protocols and Architecture	Volume I, 6 th Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Douglas E. Comer	Internetworking with TCP/IP Volume I	Prentice Hall	2015
2	Douglas E. Comer, David L.Stevens	Internetworking with TCP/IP Volume II	Prentice Hall	2010
3	Uyless Black	TCP/IP & Related Protocols	Tata McGraw-Hill	2005

Web References

1. <https://my.ine.com/ITEssentials/courses/9e5b2567/introduction-to-networking-technologies>
2. <https://nptel.ac.in/courses/106/105/106105183/>
3. <https://www.tutorialspoint.com/The-TCP-IP-Reference-Model>
4. <https://www.javatpoint.com/osi-vs-tcp-ip>
5. <https://youtu.be/rl2ZvdT4hRI>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: N.Yasodha	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)
Course Code:	21PCS1E2	Course Title:	Elective I: Wireless Networks		Batch : 2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester: I
					Credits: 5

Course Objective

To state the art wireless network convention, models Adhoc network and Wireless Sensor.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Learn state-of-the-art wireless technologies and the fundamental principles of Electromagnetic wave propagation and the parameters that dictate its performance.	K1,K2
CO2	Understand the medium access control protocols and address physical layer issues	K2
CO3	Evaluate key routing protocols for sensor networks and main design issues.	K3,K4
CO4	Sensor management, sensor network middleware, operating systems.	K5
CO5	Analyze low-power devices equipped with sensing, computation, and wireless communication capabilities.	K6

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	H	H	H	M	H	H	H
CO2	H	M	H	M	H	H	M	M	H	H	H	M	H	M	H
CO3	H	M	H	M	H	H	H	H	M	M	M	M	H	H	H
CO4	H	H	H	M	H	M	H	M	H	H	M	M	H	M	M
CO5	H	H	H	M	M	M	H	H	H	M	M	H	H	M	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Wireless Networks Introduction: Evolution of wireless networks – Challenges - Transmission fundamentals: Analog and digital data transmission - Transmission media - Modulation techniques for wireless systems - Multiple access for wireless systems - Performance increasing techniques for wireless networks.	14
UNIT II	Wireless LAN : Introduction to Wireless LANs – WLAN Equipment, Topologies, Technologies, IEEE 802.11 WLAN – Architecture and Services - Physical Layer - MAC Sub Layer –MAC Management Sub Layer, Other IEEE 802.11 Standards.	15
UNIT III	Wireless Personal Area Networks : Introduction – Bluetooth: Architecture - Protocol Stack - Physical Connection – Mac mechanism – Frame format – Connection management –Low Rate and High Rate WPAN, ZigBee Technology IEEE 802.15.4: Components – Network topologies – PHY – MAC.	16
UNIT IV	Ad-hoc Wireless Networks: Introduction- Characteristics of Adhoc Networks - Classifications of MAC Protocols: Connection Based protocols, Reservation Mechanism - Table driven Routing protocols: DSDV, WRP - On Demand routing protocols: DSR,AODV,TORA –Routing Protocol with Efficient Flooding Mechanism: OLSR - Hierarchical routing protocols – CBRP, FSR.	16

UNIT V	Wireless Sensor Networks: Introduction - Challenges for wireless sensor networks - Comparison of sensor network with ad-hoc network - Single node architecture: Hardware components - Energy consumption of sensor nodes - Network architecture: Sensor network scenarios - Design principles – Operating systems-Case Studies.				14
	Total Contact Hours				75
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.					
Text Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	Nicopolitidis P	Wireless Networks	John Wiley and Sons	2010	
2	Vijay K Garg	Wireless Communication and Networking	Morgan Kaufmann Publishers	2010	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	Siva Ram Murthy C.,Manoj B S	Ad Hoc Wireless Networks: Architectures and Protocols	Prentice Hall	2012	
2	Holger Karl and Andreas Willig,	Protocol and Architecture for Wireless Sensor Networks	John Willey Publication	2011	
Web References					
1. https://www.tutorialspoint.com/Wireless-Networks					
2. https://en.wikipedia.org/wiki/Wireless_network					
3. https://www.arubanetworks.com/products/security/network-access-control/					
4. https://www.labnol.org/tech/types-of-wireless-networks/					
5. https://www.cisco.com/c/en_in/products/wireless/					

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: N.Yasodha	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)
Course Code:	21PCS1E3	Course Title:	ELECTIVE – I : Mobile Computing		Batch : 2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester: I
					Credits: 5

Course Objective

To enable students to understand Mobile Computing Architecture with the Emerging Technologies, compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the principles and theories of mobile computing technologies	K1
CO2	Understand the possible future of mobile computing technologies and applications	K2,K3
CO3	Apply QoS over wireless channels for mobile and wireless LAN.	K5
CO4	Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.	K4,K5
CO5	Demonstrate basic skills for cellular networks design.	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	H	H	H	H	M	H	M	M	H	M	M	H	H	H
CO2	H	M	H	M	H	M	H	M	H	H	H	M	H	H	M
CO3	M	H	H	H	M	M	H	H	M	M	H	H	M	M	H
CO4	M	H	H	M	L	M	H	M	H	M	H	H	M	H	H
CO5	H	M	M	H	M	M	H	H	L	M	M	H	H	M	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction: Mobility of Bits and Bytes – Wireless-the beginning – Mobile computing – Dialog control – Networks – Middle ware and gateways – Application and Services– Developing Mobile computing applications – Security in Mobile computing – Standards –Why is it necessary? – Standard bodies – Players in the wireless space. Mobile Computing Architecture: History of computers – History of internet– Internet-the Ubiquitous Network – Architecture for mobile computing – Three-Tier architecture – Design considerations for mobile computing – Mobile computing through Internet	14
UNIT II	Mobile Computing Through Telephony: Evolution of telephony – Multiple access procedures – Mobile computing through telephone – Developing an IVR application –Voice XML – Telephony applications programming interface(TAPI). Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identifications (RFID) – Wireless Broadband (WiMAX) – Mobile IP – Internet Protocol Version 6 (IPv6) – Java card.	15
UNIT III	Global System For Mobile Communication (GSM): GSM Architecture –GSM Entities – Call routing in GSM–PLMN Interfaces–GSM Address and Identifiers–Network aspects in GSM–GSM	15

	frequency allocation – Authentications and Security. Short Message Services (SMS): Mobile computing over SMS – Short Message Services (SMS) – <i>Value added services through SMS</i> – Accessing SMS bearer.	
UNIT IV	General Packet Radio Service (GPRS): GPRS and Packet data network –GPRS Network architecture – GPRSNetworkoperations–DataservicesinGPRS–ApplicationsforGPRS–LimitationsofGPRS – Billing and charging inGPRS. Wireless Application Protocol (WAP): WAP – MMS – GPRS applications.	16
UNIT V	CDMA and 3G: Spread Spectrum technology – Is-95 – CDMA Vs GSM – Wireless data– 3rd Generation networks – Applications on 3G. Wireless LAN: Introduction- Advantages – IEEE 802.11 Standards – Wireless LAN architecture – Mobility in Wireless LAN – Deploying Wireless LAN –Wireless LAN Security – Wi-Fi Vs 3G. Wireless Devices with Windows CE: Different Flavors of Windows CE – Windows CE Architecture.	15
	Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Ashoke K Talukder, Hasan Ahmed and Roopa R Yavagal	Mobile Computing	Second Edition, Tata McGraw –Hill	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	RishabhAnand	Mobile Computing	First Edition, Khanna Publishing House	2012
2	Raj Kamal	Mobile Computing	Third Edition, Oxford University Press	2019
3	Prasant Kumar Pattnaik, Rajib Mall	Fundamentals of Mobile Computing	Second Edition, Prentice Hall India Learning Private Limited	2012

Web References

- https://www.tutorialspoint.com/wimax/what_is_wimax.htm
- <https://searchmobilecomputing.techtarget.com/definition/GSM>
- <https://memberfiles.freewebs.com/46/92/89279246/documents/MOBILE%20COMPUTING.pdf>
- <https://www.geeksforgeeks.org/general-packet-radio-service-gprs>
- <https://www.slideshare.net/bretorio/windows-ce-37163147>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: M.Dhavapriya	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS207	Course Title:	Cloud Computing		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objective

To gain knowledge on cloud computing, parallel vs. distributed computing, virtualization and data intensive computing .To enable the students to learn the applications of cloud in scientific, business and consumer and third-party cloud services.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of Cloud computing Paradigms.	K1,K2
CO2	Collaborate Cloud Service Architecture and its Service models	K3,K4
CO3	Analyze the Virtualization Concepts	K4
CO4	Analyze intensive computation in Cloud Computing	K4
CO5	Explore applications and management of Cloud Computing	K5

MAPPING

PQ/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	H	M	H	M	H	M	M	M	H	M	M	M	H	L
CO2	M	H	L	H	H	H	M	M	M	H	M	H	M	H	H
CO3	H	H	H	M	H	H	H	H	H	H	H	H	H	L	L
CO4	H	H	M	H	M	H	H	H	H	H	H	H	H	H	H
CO5	M	H	H	H	H	H	M	H	H	H	M	H	H	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction: Cloud computing at a glance - Historical developments- Building cloud computing environments - Principles of Parallel and Distributed Computing: Eras of Computing – Parallel vs distributed Computing – Elements of parallel computing – Elements of distributed computing - Technologies for distributed computing.	12
UNIT II	Virtualization: Introduction. - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing – Pros and cons of virtualization - Technology examples.	12
UNIT III	Cloud Computing Architecture : Introduction. - The cloud reference model - Types of clouds - Open challenges – Aneka : Framework overview. - Anatomy of the Aneka container - Building Aneka clouds - Cloud programming and management.	12
UNIT IV	Data-Intensive Computing : Introduction to data-intensive computing - Technologies for data-intensive computing - Aneka MapReduce programming - Cloud Platforms in Industry : Amazon web services - Google App Engine - Microsoft Azure .	12
UNIT V	Cloud Applications. : Scientific applications - Business and consumer applications. - Advanced Topics in Cloud Computing : Energy efficiency in clouds - Market-based management of clouds - Federated clouds/Inter Cloud - Third-party cloud services.	12
	Total Contact Hours	60

Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Book				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Rajkumar Buyya , Christian Vecchiola, S. Thamarai Selvi	Mastering Cloud Computing Foundations and Applications Programming	McGraw Hill Education	2017
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	M.N. Rao	Cloud Computing	PHI Learning Private Ltd.,	2015
2	Rajkumar Buyya, James Broberg, Andrzej Goscinski	Cloud Computing :Principles and Paradigms	Wiley Publication , First Edition	2013
Web References				
1. https://www.allabout-engineering.com/mastering-cloud-computing-by-rajkumar-buyya/ 2. http://docshare04.docshare.tips/files/3693/36931147.pdf 3. https://www.tutorialspoint.com/cloud_computing/index.htm 4. https://www.javatpoint.com/cloud-computing- tutorial 5. https://nptel.ac.in/courses/106/105/106105167/ 6. https://www.youtube.com/watch?v=FxI9wQBOMco				

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:S.S.Shanthi	Name: Dr.M. Sakthi	Name: K.Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS208	Course Title:	Big Data Analytics		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objective

To possess the skills necessary for utilizing tools (including deploying them on Hadoop/MapReduce) to handle a variety of big data analytics and able to apply R- tool for statistical analysis.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember how to collect, manage, store, query, and analyze various forms of big data and data types of R.	K1
CO2	Understand the foundations of Hadoop and Hadoop Distributed File System. Design of HDFS and file-based data structures along with virtualization concept.	K2,K3, K6
CO3	Analyze the working of Map Reduce and YARN for job scheduling.	K4
CO4	Analyze un-modeled, multi-structured data using Hadoop, MapReduce and how R Programming has made modifications in Big Data.	K4,K5
CO5	Compute basic summary statistics and data analysis using R Programming	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	H	H	M	M	H	H	H
CO2	H	M	M	H	H	H	M	M	H	H	H	M	H	H	H
CO3	H	H	H	M	M	H	H	H	M	M	H	H	M	M	M
CO4	M	H	M	H	M	M	H	M	H	M	H	M	H	M	H
CO5	M	H	H	H	M	M	H	H	H	M	M	H	H	M	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Fundamentals of Big Data: Evolution of Data Management- <i>Managing the data</i> – Big Data – Big data management architecture. Big Data Types: Structured data – Unstructured Data –Real Time and Non- real time requirements – Big Data together. Distributed Computing: History of Distributed Computing – Basics of Distributing Computing – Performance.	14
UNIT II	Hadoop: History of Hadoop - The Hadoop Distributed File System – components of Hadoop - Analyzing the Data with Hadoop - Design of HDFS – HDFS concepts. Hadoop I/O: Data Integrity – Compression – Serialization – File-based data structures. Virtualization: Basics of Virtualization – Managing virtualization with Hypervisor – Abstraction and Virtualization– Implementing Virtualization.	15
UNIT III	MapReduce: MapReduce workflows – unit test with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – failures in classic Map-reduce – shuffle and sort – task execution –MapReduce types – input formats – output formats.	16
UNIT IV	Hadoop Foundation and Ecosystem: Building Big Data Foundations with Hadoop Ecosystems – Managing Resources and Applications with Hadoop YARN – Storing Big Data with HBase –	16

	Mining Big Data with Hive – Interacting with Hadoop Ecosystem. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation –HiveQL queries- case study .	
UNIT V	Introducing R: The Big Picture – Exploring R – The Fundamentals of R – Work with R - Getting Started with Arithmetic – Getting Started with Reading and Writing – Working with Dimensions. Coding in R – Putting fun in functions – Controlling the logic flow – Debugging Your Code – Getting Data into and out of R – Manipulating and Processing Data – Working with Graphics – Using Base Graphics.	14
	Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Judith Hurwitz, Alan Nurgent, Dr. FernHalper, Marcia Kaufman	Big Data for Dummies	First Edition, A Wiley Publication.	2013
2	Tom White	Hadoop: The Definitive Guide	Fourth Edition, O'Reilly Publishers	2012
3	Andrie De Vries, JorisMeys	R for Dummies	2nd Edition, John Wiley & Sons	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Andreas Francois Vermeulen, Ankurgupta, Cindy Gross, David Kjerrumgaard .	Practical Hive: A Guide to Hadoop's Data Warehouse System	Apress Media publishers	2016
2	Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk	Hadoop For Dummies	John Wiley & Sons publishers	2014
3	Michael Minelli, Michelle Chambers, and AmbigaDhiraj	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses	Wiley	2013

Web References

1. <https://nptel.ac.in/courses/106/104/106104189/>
2. <https://www.edureka.co/blog/big-data-tutorial>
3. <https://www.coursera.org/learn/big-data-introduction>
4. <https://www.tutorialspoint.com/hbase/index.htm>
5. <https://www.guru99.com/hive-query-language-built-operators-functions.html>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: M.Dhavapriya	Name: Dr.M.Sakthi	Name: K. Srinivasan	Name: Dr.R.Manicka Chezian
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS2E1	Course Title:	Elective II: Software Project Management		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objectives

To provide in depth knowledge about the basic concepts of software project management, project planning, step wise framework in project planning and cost benefit.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the model from the conventional software product to the modern.	K1
CO2	Understand various estimation levels of cost and effort.	K2
CO3	Deploy various artifacts sets for better understanding of software development.	K3
CO4	Analyze and design the software architecture.	K4
CO5	Validate appropriate project management approach through an evaluation of the business context and scope of the project.	K5

Mapping

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	M	M	L	L	H	H	L	M	L	H	L	M
CO2	H	M	M	H	H	L	M	H	M	H	H	L	H	M	M
CO3	H	L	L	H	L	M	H	M	M	H	L	M	H	L	L
CO4	H	M	L	L	M	M	H	M	L	M	M	M	H	M	L
CO5	H	L	L	H	M	M	M	H	L	M	M	M	H	L	L

H-High; M-Medium; L-Low.

Units	Contents	Hrs
UNIT I	Introduction: Software Project Management -Software Project Versus Other Project – Requirement Specification –Information and Control in Organization –Introduction to step wise Project Planning –Select –Identify Scope and Objectives -Identify Project Infrastructure –Analyze Project Characteristics –Products and Activities –Estimate Effort for each Activity –Identify Activity Risks –Allocate Resources -Review / Publicize Plan –Execute Plan and Lower Levels of Planning.	12
UNIT II	Project Evaluation: Introduction –Strategic Assessment –Technical Assessment –Cost Benefit Analysis –Cash Flow Forecasting –Cost Benefit Evaluation Techniques –Risk Evaluation –Selection of an Appropriate Project Approach –Choosing Technologies –Choice of Process Models –Structured Methods – Rapid Application Development –Waterfall Model –V-Process Model –Spiral Model – Software Prototyping –Ways of Categorizing Prototypes –Tools –Incremental Delivery –Selection Process Model.	12
UNIT III	Software Effort Estimation : Introduction –where estimation done-problem with over	12

	and under estimation-basics for software estimation-software effort estimation techniques-basics of software estimating-software effort estimation techniques-estimation by analogy-albrech function point analysis-function point mark II-procedural code oriented approach-COCOMO a parametric model-publishing resource schedules-cost scheduling-scheduling sequence.			
UNIT IV	Monitoring and Control: Introduction – creating the framework-collecting the data-visualizing progress-cost monitoring-earn values-priority monitoring-getting the project back to target-change control Discussion on case study - Expert lectures - Online seminars – Webinars – Workshops.	12		
UNIT V	Managing Contracts: Introduction –Types of Contract –Stages in Contract Placement – Terms of Contract –Contract Management –Acceptance –Managing People and Organizing Teams –Organizational Behavior Background –Selecting the Right Person for the Job –Instruction in the Best Methods – Motivation –Decision Making –Leadership – Organizational Structures –Software Quality –Importance –Practical Measures –Product.	12		
	Total Contact Hours	60		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Book				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Bob Hughes , Mike Cotterell , Rajib Mall	Software Project Management	6th Edition	2017
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Walker Royce	Software Project Management: A Unified Framework	Addison Wesley	1998
2	DerrellInce, H. Sharp and M. Woodman	Introduction to Software Project Management and Quality Assurance	Tata McGraw Hill,	1995
Web References				
1. https://www.wrike.com/project-management-guide/faq/what-is-software-project-management/				
2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm				
3. https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/				
4. https://www.forecast.app/blog/benefits-of-using-project-management-software				

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: N.Karthikeyan	Name: Dr.M.Sakthi	Name: K.Srinivasan	Name: Dr.R.Muthukumaran
Signature:	Signature:	Signature:	Signature:

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS2E2	Course Title:	Elective – II: Software Engineering and Testing		Batch	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objective

To learn all the software development approaches, design methodologies, test metrics, measurements, tools in software development process and testing

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Recollect basic software process models to ensure that software designs, development and maintenance meet or exceed applicable standards.	K1
CO2	Understand concepts of software management activities, requirement gathering, design, analysis and maintenance.	K2
CO3	Apply advanced software projects in designing, testing, cost estimation and risk management.	K3
CO4	Analyze and implement the design by types of testing, scenarios, process, methodologies and architecture for automation, using testing tools and solve challenges in testing.	K4
CO5	Access verification and validation, integrate functional and non-functional testing, to perform regression testing, framework for test tools, testing an application using WinRunner tool.	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	H	H	M	M	M	M	H	H	M	M	M	H
CO2	M	H	M	M	H	H	M	M	H	M	H	H	M	M	H
CO3	H	H	H	M	H	H	H	M	H	H	H	H	H	M	H
CO4	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Software Engineering: Defining software, Software Application Domains, Legacy Software Engineering, The software process, Software Engineering practice – The essence of Practice- General Principles -Software Myths. Process models: A generic process model– Defining a framework activity-identifying a task set-process patterns . Requirement Modeling: Requirement Analysis-Data modeling concepts- Class-based modeling- Requirement modeling strategies-Flow oriented modeling.	12
UNIT II	Design Concepts: Design within the context of Software Engineering-The design process – Software quality guidelines and attributes-The evolution of software design-Design	12

	concepts – abstraction-architecture-patterns-separation of concerns-modularity-information hiding-functional independence-refinement aspects refactoring. Object Oriented Design Concepts: Design classes- design model – data design elements-architectural design elements- interface design elements-component level- deployment level design elements.			
UNIT III	Software Quality Assurance: SQA tasks-Goals and metrics-Formal approaches to SQA-Statistical Software quality assurance: A Generic example–six sigma for software Engineering-Software Reliability-Measures of Reliability and availability-software safety-SQA plan. Project Management concepts: The management spectrum. Estimation for software projects: The project planning process-Software project estimation-Decomposition techniques-Empirical estimation models-Project scheduling. Risk management: Risk identification-Risk projection-The RMMM plan.	12		
UNIT IV	Software development life cycle: Phases of Software Project-Quality Assurance and Quality Control-Testing-Verification and Validation. White Box Testing: Static Testing-Structural Testing- Challenges. Black Box Testing: Introduction on Black Box Testing-Reason for Black Box Testing-When to do Black Box Testing-How to do Black Box Testing. Integration Testing: Integration Testing as a type of Testing- Integration Testing as a phase of Testing- Scenario Testing-Defect Bash. System and Acceptance Testing: Functional System Testing- Non Functional Testing- Acceptance Testing.	12		
UNIT V	Performance Testing: Methodology-Tools-Process-Challenges. Regression Testing: Types-When to do Regression Testing- How to do Regression Testing. Internationalization Testing. Software Test Automation: Skills needed for Automation-What to Automate- Scope of Automation-Design and Architecture for Automation-Generic requirements for Test Tools Framework-Selecting a Test Tool-Challenges. Test Metrics and Measurements: Metrics and Measurements-Metrics in Testing-Types of Metrics. WinRunner: Overview of WinRunner-Testing an Application using WinRunner-Test Script Language- Synchronization of Test Cases-Data Driven Testing-Rapid TestScript Wizard-Mapping Custom Object to Standard Class-Checking GUI	12		
	Total Contact Hours	60		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION
1	Pressman S. Roger	Software Engineering A Practitioner’s Approach	McGraw Hill, International Editions, 8 th edition	2019
2	Srinivasan Desikan, Gopalaswamy Ramesh	Software Testing Principles and Practices	PearsonEducation-10 th impression	2015
3	DrK.V.K.KPrasad	Software testing tools	Dream tech press, New Delhi	2007
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Sommerville Ian	Software Engineering	Addison Wesley,10 th Edition	2015
2	Rumbaugh, James	Object Oriented Modeling and design	Pearson Education, New Delhi Evaluation Pattern.	2005

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS2N1	Course Title:	Non-Major Elective I: Web Designing Lab		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		2	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	2

Course Objective

To enable the students to develop and design various applications using Web Technology.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Apply critical thinking skills	K3
CO2	Analyze and write a well formed / valid XML document	K4
CO3	Access and analyze website performance by interpreting analytics to measure site traffic, SEO, engagement, and activity on social media	K3
CO4	Access XSL transformation, sorting..	K4
CO5	Design and create websites	K5, K6

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	M	H	H	H	M	M	H	H	H	H	H	M
CO2	H	M	M	H	H	H	M	M	H	H	M	H	H	M	M
CO3	H	H	H	M	H	H	H	H	M	H	H	M	H	H	H
CO4	M	H	M	H	M	M	H	M	H	M	H	H	M	H	M
CO5	M	H	H	H	M	M	H	H	H	M	H	M	M	H	H

H: High; M: Medium; L: Low.

Contents		Hrs
- HTML Tags - Tables - Forms - Frames - CSS Rules, CSS Grouping Style, XML usingCSS		15
- Address Book - DTD for BookInformation - Resume Creation usingDTD - XSL Transformation, XSLSorting - Event Handling - Filters		15
Total Contact Hours		30
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Assignments.		

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS2N2	Course Title:	Non-Major Elective I: Advanced Internet Technologies		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		2	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	2

Course Objective

To develop and design fundamentals of Internet, use Google and the Web functions.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of Internet and the Web concepts.	K3
CO2	Analyze and apply the online information resources.	K4
CO3	Inspect and utilize the appropriate Google Apps for education effectively.	K4
CO4	Analyze the concepts of World wide web	K5
CO5	Developing Web forms	K5

MAPPING

PO/PSO CO	PO 1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	M	H	H	H	H	H	M
CO2	M	M	H	M	H	H	M	M	H	H	M	H	H	M	M
CO3	H	H	H	H	M	H	H	H	M	H	H	M	H	H	H
CO4	H	H	H	H	H	M	H	M	H	M	H	H	M	H	M
CO5	H	H	M	H	M	M	H	H	H	M	H	M	M	H	H

H: High; M: Medium; L: Low.

Contents		Hrs
- Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated. - Create a label and upload bulk contacts using import option in Google Contacts - Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials. - Create and share a folder in Google Drive using 'share a link' option and set the permission to access that folder by your friends only.		10
- Create one-page story in your mother tongue by using voice recognition facility of Google Docs. - Create a registration form for your Department Seminar or Conference using Google Forms. - Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms. - Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after submission.		10
- Create template for a seminar certificate using Google Slides. - Create a mark statement in Google Sheets and download it as PDF, .xls and .csv files		10
Total Contact Hours		30

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS3E1	Course Title:	Elective III: Artificial Intelligence & Machine Learning		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	5

Course Objective

To provide the knowledge of problem solving using AI techniques, knowledge representations and to understand the concepts of predicate logic.

To understand the basic concepts of machine learning, probability theory and also algorithms of supervised learning and unsupervised learning.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Learn about the artificial intelligence problem and the characteristics of the problem space.	K2
CO2	Identifies the Heuristics search techniques and issues in representing the knowledge and comprehend the statistical reasoning	K3
CO3	Understand the problem solving using predicates and infer the knowledge using rules	K2,K4
CO4	Design a learning model appropriate to the application and recognize the characteristics of machine learning techniques that are useful to solve real-world problems	K5
CO5	Design and implement various machine learning algorithms in a range of real-world applications	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	L	L	L	L	L	L	L	L	L	M	M	M	L	M
CO2	M	L	M	M	L	L	L	L	L	L	M	M	M	L	M
CO3	M	L	M	L	M	L	L	L	L	M	M	M	M	L	M
CO4	H	H	H	H	H	H	L	L	L	H	H	H	H	H	H
CO5	H	H	H	H	H	H	L	L	L	H	H	H	H	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction: AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search. Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis.	15
UNIT II	Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	15

	Statistical Reasoning: Probability and Baye's Theorem – Certainty Factors and Rule-based System – Bayesian Networks – Fuzzy Logic	
UNIT III	Using Predicate logic: Representing simple facts in logic - Representing Instance and ISA relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge - Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.	15
UNIT IV	Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning – Machine Learning Process – Weight Space - Curse of Dimensionality – Testing Machine Learning Algorithms – Turning Data into Probabilities – The Bias-Variance Tradeoff – Linear Regression – Linear Discriminant Analysis - Principal Components Analysis – Nearest Neighbour Methods	15
UNIT V	Support Vector Machine: Optimal Separation – Kernels – Algorithm - Learning with Trees: Constructing Decision Trees – Bagging – Boosting – Random Forest - Unsupervised Learning: K-Means Algorithm - Graphical Models: Bayesian Networks - Deep Learning. Case Study: Implementation of classification algorithm for problems in financial domain	15
	Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Elaine Rich, Kevin Knight, & Shivashankar B Nair	Artificial Intelligence	Third Edition, McGraw Hill Education (India) Private Limited, New Delhi	2009, Reprint 2016.
2	Stephen Marsland	Machine Learning – An Algorithmic Perspective	Chapman and Hall, CRC Press, Second Edition	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Stuart J. Russell, Peter Norvig	Artificial Intelligence - A Modern Approach	Third Edition, Pearson Publishers	2015
2	Ethem Alpaydin	Introduction to Machine Learning	Third Edition, Prentice Hall of India	2015
3	P. Flach	Machine Learning: The art and science of algorithms that make sense of data	Cambridge University Press	2012
4	Elaine Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill Publishers company Pvt Ltd, Second Edition	1991

Web References1. <https://www.javatpoint.com/machine-learning>

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	21PCS3E2	Course Title:	Elective III: Data Science		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	5

Course Objective

To understand text processing for extracting information and to provide insights into fundamental concepts to speech processing and phonetic.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the data science concepts and infer the knowledge about data science process	K2,K4
CO2	Illustrate the basics of natural language processing and apply feature engineering concept for text representation	K2,K3
CO3	Analyze text classification and evaluate the classification model in real word application	K4,K5
CO4	Learn and apply different text analytics techniques to retrieve information from text	K3
CO5	Understand the basic concept of speech recognition and analyze the phonetic in speech	K2,K4

MAPPING

PQ/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	L	H	H	L	M	L	L	L	H	H	H	H	H	H
CO2	M	L	H	H	L	L	L	L	L	M	H	H	H	H	H
CO3	H	M	H	M	M	L	L	L	L	H	H	H	H	H	H
CO4	H	H	H	M	M	M	L	L	L	H	H	H	H	H	H
CO5	L	L	M	M	M	M	L	L	L	M	M	M	M	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	Introduction to data science - case for data science - data science classification - data science algorithms - Data Science Process - prior Knowledge - Data Preparation - Modeling - Application - Knowledge - Data Exploration - Objectives of data Exploration - Datasets - Descriptive Statistics - Roadmap for data exploration.	15
UNIT II	Natural language Processing basics - Language Syntax and Structure - Language Semantics - Natural language Processing - Text Analytics - Text Preprocessing and Wrangling - Understanding Text Syntax and Structure - Feature Engineering for Text Representation - Traditional Feature Engineering Models - bag of words model - bag of N-Grams model - TF - IDF Model – Topic Models	15
UNIT III	Text Classification - Automated Text Classification - Text Classification Blueprint - Classification Models - Multinomial Naïve Bayes - Logistic Regression - Support Vector	15

	Machines - Ensemble Models - Random Forest - Gradient Boosting Machines - Evaluating Classification Models – Text Similarity and clustering - Essential Concepts - Analyzing term Similarity - Analyzing Document Similarity - Document Clustering			
UNIT IV	Feature Engineering - K-means Clustering - Affinity Propagation - Wards Agglomerative Hierarchical Clustering - Semantic Analysis - Exploring Word net - Word Sense Disambiguation - Named Entity Recognition - Analyzing Semantic Representations - Sentiment Analysis - Unsupervised Lexicon-Based Models - Bing Lius Lexicon - MPQA Subjectivity Lexicon - Pattern Lexicon – Text Blob Lexicon - AFINN Lexicon – Senti WordNet Lexicon - VADER Lexicon - Classifying Sentiment with Supervised Learning.	15		
UNIT V	Speech - Phonetics - Speech Sounds and Phonetic Transcription - Articulatory Phonetics - Phonological Categories and Pronunciation variation - Acoustics Phonetics and Signals - Speech Synthesis - Phonetic Analysis - Prosodic Analysis - Diphone Waveform synthesis - Automatic Speech Recognition - Speech Recognition Architecture - Applying Hidden Markov Model to Speech.	15		
	Total Contact Hours	75		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION
1	Vijay Kotu, Bala Deshpande	Data Science: Concepts and Practice	Second Edition, Elsevier Publications	2019
2	DipanjanSarkar	Text Analytics with Python: A Practitioner’s Guide to Natural Language Processing	A Press	2019
3	Daniel Jurafsky, James H. Martin	Speech and Language Processing	Pearson	2009
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	AdiAdhikari and John De Nero	Computational and Inferential Thinking: The Foundations of Data Science	First edition	2019
2	D. Jurafsky, J.H. Martin	Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition	3rd Edition Draft	2019

Programme Code:		M.Sc CS	Programme Title:		Master of Science (ComputerScience)	
Course Code:	21PCS3E3	Course Title:	Elective III: Robotic Process Automation for Business		Batch :	2021-2023
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	5

Course Objective

To gain knowledge on concepts of RPA, its benefits, types and models. Also in applications of RPA in Business Scenarios and identify measures and skills required for RPA.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the benefits and ethics of RPA	K1
CO2	Understand the Automation cycle and its techniques	K2
CO3	Apply the of design inferences and information processing of RPA	K3
CO4	Implement & Apply RPA in Business Scenarios	K4
CO5	Analyze on Robots & leveraging automation	K4

MAPPING

PQ/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	H	H	H	M	H	H	M	H	M	H	H
CO2	H	H	M	H	H	H	M	M	H	H	M	H	H	H	H
CO3	H	H	H	M	H	H	H	H	M	H	H	H	H	H	H
CO4	H	H	H	H	H	M	H	M	H	H	H	H	H	H	H
CO5	H	H	M	H	H	M	H	H	H	H	H	H	H	H	H

H: High; M: Medium; L: Low.

Units	Contents	Hrs
UNIT I	INTRODUCTION: Overview of RPA - Benefits of RPA in a business environment - Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA - Centre of Excellence – Types and their applications - Building an RPA team - Approach for implementing RPA initiatives.	15
UNIT II	AUTOMATION : Role of a Business Manager in Automation initiatives - Skills required by a Business Manager for successful automation - The importance of a Business Manager in automation - Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automation stages and activities performed by different people.	15
UNIT III	AUTOMATION IMPLEMENTATION: Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post-implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option - Sending	15

	emails - Publishing and Running Workflows.				
UNIT IV	ROBOT: Ability to process information through scopes/systems - Understand the skill of information processing and its use in business - Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.				15
UNIT V	ROBOT SKILL: Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this skill-Case Study.				15
	Total Contact Hours				75
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.					
Text Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION	
1	Alok Mani Tripathi	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool	Packt Publishing Limited	2018	
2	Tom Taulli	The Robotic Process Automation Handbook	Apress	2020	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	Steve Kaelble	Robotic Process Automation	John Wiley & Sons, Ltd.,	2018	
Web References					
1. https://www.tutorialspoint.com/uiopath/uiopath_robotic_process_automation_introduction.htm					
2. https://www.javatpoint.com/rpa					
3. https://onlinecourses.nptel.ac.in/noc19_me74/preview					
4. https://www.info.com/serp?q=robotic+process+automation+tools&sc=D1P8CkHi8kSP02					
5. https://irpaai.com/what-is-robotic-process-automation/					

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: G.Angayarkanni Signature:	Name: Dr.M.Sakthi Signature:	Name: K. Srinivasan Signature:	Name: Dr.R.Manicka Chezian Signature: