

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

373	B.A Tamil	ARA ILAKKIYAM	21UTM102	2021
374	B.A Tamil	Sitru illakiyam	21UTM204	2021
375	B.A Tamil	Bhakthi Illakiyam	21UTM306	2021
376	B.A Tamil	Computer Practical	21UTM3A4	2021
377	B.A Tamil	NME II: Tamilum Pira Thuraikalum/ Noolakaviyal	21UTM4N3/ 21UTM4N4	2021
378	B.A Tamil	Kappiyangal	21UTM509	2021
379	B.A Tamil	Tamilar Panpadu	21UTM5AL	2021
380	B.A Tamil	Ettuthogai	21UTM613	2021
381	B.A Tamil	Pathupatu	21UTM614	2021
382	B.A Tamil	Natupuraviyal	21UTM615	2021
383	B.A Tamil	Sutrulaviyal	21UTM6E5	2021
384	B.A Tamil	Tamilum ulaka semozikalum	21UTM6AL	2021
385	B.Sc Computer Science	Core I: Programming in C and C++	21UCS101	2021
386	B.Sc Computer Science	Allied-1: Mathematics and applied statistical	21UCS1A2	2021
387	B.Sc Computer Science	CC Lab I: Programming Lab in C and C++	21UCS103	2021
388	B.Sc Computer Science	Allied-2: Discrete mathematical Structure	21UCS2A2	2021
389	B.Sc Computer Science	Core V: NET Technologies	21UCS307	2021
390	B.Sc Computer Science	Core VII: System software and operating system	21UCS309	2021
391	B.Sc Computer Science	Core Lab III: Programming Lab in NET	21UCS310	2021
392	B.Sc Computer Science	Core XI: Linux and Shell Programming	21UCS517	2021
393	B.Sc Computer Science	Core Lab VII: Linux Shell and Socket Programming Lab	21UCS520	2021
394	B.Sc Computer Science	Data engineering with Google cloud	21UCS5E2	2021
395	B.Sc Computer Science	Mobile Application Development	21UCS5E3	2021
396	B.Sc Computer Science	Core Elective II: Artificial intelligence and machine	21UCS6E4	2021
397	B.Sc Computer Science	Core Elective II: Front end development with react	21UCS6E5	2021

HIGHLIGHTED



Metric : 1.2.1



New Course Introduced

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

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NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

398	B.Sc Computer Science	Core Elective II:MongoDB	21UCS6E6	2021
399	B.Sc Computer Science	Core Elective III:Information retrieval	21UCS6E7	2021
400	B.Sc Computer Science	Core Elective III:HTML,JAVA Script and JQuery for	21UCS6E8	2021
401	B.Sc Computer Science	Core Elective III:Angular NodeJS	21UCS6E9	2021
402	B.Sc.IT	Visual Programming	21UIT414	2021
403	B.Sc.IT	Visual Programming Lab	21UIT416	2021
404	B.Sc.IT	Skill Based Major Elective - Lab. I WebProgramming(ASP.NET)	21UIT5S12	2021
405	B.Sc.IT	Artificial Intelligence	21UIT5E12	2021
406	B.Sc.IT	Core-XIV:Skill Enhanced Course: Python Programming	21UIT621	2021
407	B.Sc.IT	Core Lab - IX: Python Programming Lab	21UIT622	2021
408	B.Sc.IT	Core Elective-II: Internet of Things	21UIT6E22	2021
409	B.Sc.IT	Core Elective-II: Block Chain Technology	21UIT6E23	2021
410	B.Sc.IT	Core Elective-II: R Programming	21UIT6E21	2021
411	B.Sc.IT	Project Planning and Management	21UIT623	2021
412	B.Sc. CT	Core IX: Linux And Shell Programming	21UCT413	2021
413	B.Sc. CT	Core VI: Database Management System	21UCT308	2021
414	B.Sc. CT	Lab - VI : Linux And Shell Programming Lab	21UCT416	2021
415	B.Sc. CT	Core Elective - I : Management Information System	21UCT5E3	2021
416	B.Sc. CT	Core Elective - II : Software Project Management	21UCT 6E2	2021
417	B.Sc. CT	Core Elective - II : Grid Computing	21UCT 6E3	2021
418	B.Sc. CT	Core Elective - III : Digital Image Processing	21UCT 6E6	2021
419	B.Sc. CT	Software Testing	21UCT5AL	2021
420	B.Sc. CT	Data Analytics	21UCT6AL	2021
421	BCA	Programming in C++	21UBC206	2021
422	BCA	Web Designing Lab	21UBC418	2021
423	BCA	Software Testing	21 UBC520	2021

Metric : 1.2.1



New Course Introduced

Dr. R. MUTHUKUMARAN,
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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

B.Sc. – COMPUTER SCIENCE DEGREE COURSE
(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2021 ONWARDS)
I to VI SEMESTERS: SCHEME OF EXAMINATIONS

Part	Course Code	Title of the Paper	Hrs/ Week		Exam Hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
<u>I SEMESTER</u>									
I	21UTL101/ 21UHN101/ 21UFR101	Tamil Paper-I/ Hindi Paper-I/ French Paper-I	6		3	50	50	100	3
II	21UEN101	Communication Skill-I (Level I)	5		3	50	50	100	3
	21UEN102	Communication Skill-I (Level II)							
III	21UCS101	Core I: Programming in C and C++	4		3	50	50	100	4
	21UCS102	Core II: Digital Computer fundamentals and organization	4		3	50	50	100	4
	21UCS1A1/ 21UCS1A2	Allied-I: Mathematics (statistical and Numerical Methods) Allied-I: Advanced Mathematics and Applied statistical	4		3	50	50	100	4
	21UCS103	Core Lab I: Programming Lab in C and C++		5	3	25	25	50	2
IV	21HEC101	Human Excellence: Personal Values& SKY Yoga Practice-I	1		2	25	25	50	1
	21UHR101	Human Rights in India	1		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
CC	21CFE101	Fluency in English– I	-	-	--	-	-	-	-
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)		-	-	-	-	-	-
Total								650	23

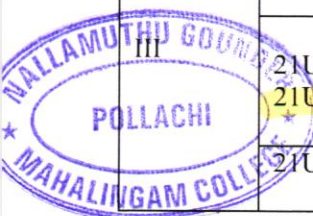
II SEMESTER

Part	Course Code	Title of the Paper	Hrs/Week		Exam Hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
I	21UTL202/ 21UHN202/ 21UFR202	Tamil Paper-II/ Hindi Paper-II/ French Paper-II	6		3	50	50	100	3
II	21UEN202	English Paper – II	5		3	50	50	100	3
III	21UCS204	Core III: Java Programming	4		3	50	50	100	4
	21UCS205	Core IV: Data and File Structure	4		3	50	50	100	4
	21UCS2A1/ 21UCS2A2	Allied -2: Discrete Mathematics Level-I Allied-2: Discrete Mathematical Structure Level-II	4		3	50	50	100	4
	21UCS206	Core Lab II: Programming Lab in Java		4	3	25	35	50	2

Dr. R. MANICKA CHEZIAN M.Sc., M.S., Ph.D.

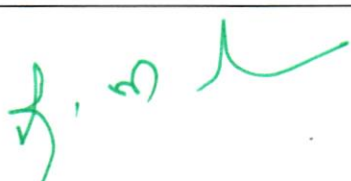
PRINCIPAL i/c

Nallamuthu Gounder Mahalingam College
Pollachi - 642 001, Coimbatore District



IV	21HEC202	Human Excellence: Family Values& SKY Yoga Practice-2		1	2	25	25	50	1
	21EVS201	Environmental Studies	2		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
CC	21CFE202	Communicative English (Fluency) – II	-	-	-	-	-	-	-
	21CMM201	Manaiyiyal Mahathuvam - I	-	1	-	-	50	50	-
	21CUB201	Uzhavu Bharatham – I	-	1	-	-	50	50	-
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)							
Total								650	23




Dr. R. MANICKA CHEZIAN M.Sc., M.S., Ph.D.,
 PRINCIPAL i/c
 Nallamuthu Gounder Mahalingam College
 Pollachi - 642 001, Coimbatore District.

SEMESTER III AND IV

Part	Course Code	Title of the Paper	Hrs/Week		Exam Hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
III SEMESTER									
III	21UCS307	Core V:.NET Technologies	4		3	50	50	100	4
	21UCS308	Core VI: Relational Database Management System	5		3	50	50	100	4
	21UCS309	Core VII: System Software and Operating System	4		3	50	50	100	4
	21UCS3A3	Allied -3 : Computer Based Optimization Techniques	5		3	50	50	100	4
	21UCS310	Core Lab III: Programming Lab in .NET Technologies		5	3	25	25	50	2
	21UCS311	Core Lab IV: Programming Lab in RDBMS		5	3	25	25	50	2
IV	21HEC303	Human Excellence Paper: Professional Values& SKY Yoga Practice-3		1	2	25	25	50	1
	21UCS3N1 / 21UCS3N2	Non-Major Elective Paper-I Photoshop Lab/ Advanced Applications in MS Excel Lab		1	2		50	50	2
	V	Extension Activities (NSS, NCC, Sports & Games)							
CC	21CFE303	Communicative English (Fluency) – III	-	-	-	-	-	-	-
	21CMM302	Manaiyiyal Mahathuvam - II	-	1	-	-	50	50	-
	21CUB302	Uzhavu Bharatham – II	-	1	-	-	50	50	-
	21UCS3VA	Department Specific Value Added Course (Mandatory)		30 HRS					2
Total								600	23
IV SEMESTER									
Part	Course Code	Title of the Paper	Hrs/Week		Exam hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
III	21UCS412	Core VIII: Python Programming	4		3	50	50	100	4
	21UCS413	Core IX: Open Source Technologies	4		3	50	50	100	4
	21UCS414	Core X: Data Communication and Computer Networks	4		3	50	50	100	4
	21UCS4A4	Allied -4 : Accountancy for Decision Making	6		3	50	50	100	4
	21UCS415	Core Lab V: Programming Lab using Python		5	3	25	25	50	2
	21UCS416	Core Lab VI:Web Programming using Open Source Technologies		5	3	25	25	50	2
IV	21HEC404	Human Excellence Paper : Social Values & SKY Yoga Practice-4		1	2	25	25	50	1

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	21UCS4N1 / 21UCS4N2	Non-Major Elective Paper-II Flash Lab/ Internet Services and Applications Lab		1	2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
CC	21CFE404	Communicative English (Fluency) – III							
	21CMM404	Manaiyiyal Mahathuvam - III		1			50	50	
	21CUB403	Uzhavu Bharatham – III		1			50	50	
	21UCS4VA	Department Specific Value Added Course (Mandatory)	30 HRS						2
Total								600	23



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SEMESTER V AND VI

SEMESTER V									
Part	Course Code	Course Title	Hrs/ Week		Exam Hrs	MAX.MARKS			Credits
						CIA	ESE	Total	
III	21UCS517	Core XI: Linux and Shell Programming	4		3	50	50	100	3
	21UCS518	Core XII: Kotlin Programming	4		3	50	50	100	3
	21UCS519	Core XIII: Cyber Security	4		3	50	50	100	2
	21UCS5E1/	Core Elective-I: Data Mining and Warehousing /	5		3	50	50	100	4
	21UCS5E2/	Data Engineering with Google Cloud /							
	21UCS5E3	Mobile Application Development							
	21UCS520	Core Lab VII: Linux and Shell Programming Lab		4	3	50	50	100	3
	21UCS521	Core Lab VIII: Programming Lab using Kotlin		5	3	50	50	100	3
	21UCS5AL	Advanced Learner Course – I (Optional) - Self Study				50	50	100	3*
IV	21UCS5S1/	Skill Enhancement Course-I: Word Press /		3	2		50	50	3
	21UCS5S2 /	Dream Weaver /							
	21UCS5S3	Quantitative Aptitude Skills							
	21HEC505	Human Excellence Paper: National Values& SKY Yoga Practice-5		1	2	25	25	50	1
	21GKL501	General Knowledge		SS	2	-	50	50	2
V		Extension Activities - Annexure I							
CC	21CEF505	Communicative English (Fluency) – V							
	21CSD501	Soft Skills Development – I							
Total								750	24

VI SEMESTER

Part	Course Code	Course Title	Hrs/ Week		Exam/ Hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
III	21UCS622	Core XIV: R Programming	4		3	50	50	100	3
	21UCS6E4/	Core Elective – II: Artificial Intelligence and Machine Learning /	6		3	50	50	100	5
	21UCS6E5/	Front End Development with React /							
	21UCS6E6	MongoDB (4hrs theory and 2hrs lab)							
	21UCS6E7/	Core Elective – III: Information Retrieval /	6		3	50	50	100	5
	21UCS6E8/	HTML, Javascript and JQuery for Web Designing /							
	21UCS6E9	Angular NodeJS (4hrs theory and 2hrs lab)							
	21UCS623	Core Lab IX: R Programming Lab		5	3	50	50	100	2
	21UCS624	Core Lab X: Advanced Applications in MS Excel Lab		5	3	25	25	50	2

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	21UCS625	Project		-	-	50	50	100	3
	21UCS6AL	Advanced Learner Course - II (Optional) - Self Study				50	50	100	3*
IV	21UCS6S4/ 21UCS6S5/ 21UCS6S6	Skill Enhancement Course-II: Joomla / Macromedia Director / Soft Skills		3	2		50	50	3
	21HEC606	Human Excellence Paper: Global Values & SKY Yoga Practice-6		1	2	25	25	50	1
V		Extension Activities - Annexure I							
CC	21CEF606	Communicative English (Fluency) – VI							
	21CSD602	Soft Skills Development – II							
Total								650	24
Grand Total								3900	140

* Extra Credits



[Handwritten Signature]
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Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21UCS101			Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core I: Programming in _C_ and _C++_	Semester:	I
					Credits:	4

Course Objective

On successful completion of this course the students should understand the core concepts and techniques in C programming and to understand the object oriented programming concepts such as classes, objects, inheritance, overloading and file handling. It provides the technical skills to the students to design and develop the applications and to solve the real world problems using C/C++.

Course Outcomes (CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of C programming and select appropriate data types, looping and functions for solving a given problem.	K2, K5
CO2	Remember the concept of structures, memory allocation and file handling and develop C programming using pointer and file management	K2, K3
CO3	Define the different programming paradigm and conceptualize elements of OO methodology and apply encapsulation concepts in developing the programs with classes and objects.	K1, K3
CO4	Identify the concepts of functions, constructor and its types and create applications using overloading features.	K3, K5
CO5	Analyze the usage of different kinds of inheritance and its types in real world scenario and Explain the importance of exception handling	K4, K5

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	L	H	L	L	M	M	H	H
CO2	H	H	H	L	L	H	M	M	H	M	H	H
CO3	H	M	H	L	M	M	L	L	H	L	M	H
CO4	H	M	H	L	M	M	L	M	H	L	M	H
CO5	H	H	H	L	M	H	M	M	H	M	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	Introduction of Programming Languages: Types of Languages - Evolution of 'C' Language - Structure of a '_C' Program - '_C' Program development life cycle - Executing and Debugging a '_C' Program; 'C' Tokens: Keywords and Identifiers – Operators – Constants – Variables - Data Types - Precedence of Operators - Scope and Lifetime of Variables; Control Statement and Expressions: Decision Making using if statement - Types of if ...else block - Switch case Block - Arithmetic Expressions - Evaluation of Expressions - GOTO statement; Looping: Concept of Loop - For loop - While loop - Do while loop - Jumping in Loop - break and continue statement; Arrays and String: Introduction of Array - One D Array - Two D Array – Multidimensional Array - Dynamic Arrays - Implementing String Variables - String handling Functions; Functions: Concept of Function - User defined Function - System Defined Function - Types of parameter passing in function	10
Unit II	Structure and Unions: Need of Structure - Implementing Structure Variable - Arrays of Structure - Structure within Structure - Introduction of Unions - Difference between Structure and Unions; File Handling using 'C': Opening and Closing File - Input / Output operations on File - Random Access to Files - Command Line Arguments; Dynamic Memory Allocation: Concept of Dynamic Allocation - Implementing Malloc and Calloc Functions - Releasing the free space; Storage Classes and Pre-processor: Introduction of Storage Class - Types of Storage Classes - Introduction of Pre-processor - Macro Substitution - File Inclusion	11
Unit III	Introduction to Object Oriented Programming: Concept of OOP - Features of OOP Introduction of '_C++' - Structure of '_C++' program - Executing and Debugging a '_C++' Program; 'C++' Tokens and Type Casting: Keywords and Identifiers – Operators – Constants – Variables - Data Types - Precedence of Operators - Scope and Lifetime of Variables; Classes & Objects: Classes & Object Specifier - Defining data members and member functions - Array of objects - Managing console I/O - '_C++' stream classes - Formatted and unformatted console I/O - Usage of manipulators	10
Unit IV	Function in 'C++': Call by reference, Return by reference - Function overloading and default arguments - Inline function - Static class members - Friend functions - Virtual Functions; Constructors and Destructor: Concept of Constructor - Types of Constructors - Memory allocation (new and delete) - Usage of destructor; Operator Overloading: Overloading Unary and Binary operators - Overloading using friend function	11
Unit V	Inheritance: Types of inheritance - Virtual base classes and abstract base classes - Constructor and destructor in derived class; Working with files: File operations - File pointer and their	10

	manipulation - File Updation with random access; Exception Handling: Various Exception Handling classes - Implementing try and catch block - Use of throw keyword	
	Total Contact Hrs	52

Pedagogy and Assessment Methods:

Direct Instruction Digital Presentation, Digital Assignments, Seminar, Power Point Presentation, Online Quiz, Group Talk (APS).

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Programming in Ansi C	Tata McGraw-Hill Publishing Co& Ltd., Sixth Edition	2016.
2	E. Balagurusamy	Object Oriented Programming with C++	Tata McGraw Hill publication, Fifth edition	2012.

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Yaswanth Kanishkar	LET US C	BPB Publications, Fourteenth Edition	2016
2	Ashok N. Kamthane	Programming with ANSI and Turbo C	First Edition	2009
3	D.Ravichandran.J	Programming with C++	Tata McGraw Hill publication, fourteenth edition	2001

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Dr. Aruchamy Rajini	Name: Dr.Antony Selvadoss Thanamani	Name: K.Srinivasan	Name: Dr.R.Manicka Chezian
Dr. M. Sakthi	Signature:	Signature:	Signature:

Level II

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21UCS1A2			Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Allied-1: Advanced Mathematics and applied Statistics	Semester:	I
					Credits:	4

Course Objective

- To apply the computational aspects of basic statistical measures and to enable the students to solve linear system of equations and integration using numerical methods.
- To present the concept of theoretical probability to acquaint the knowledge of testing of small and large samples which plays an important role in real life problems

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand and analyze the statistical formula and apply them in various data analysis problems and Measure and interpret the degree of relationship between variables.	K4,K2
CO2	Apply the distributions to infer the behavior of observation in the sample space and also learn its moment generating function	K4
CO3	Analyze the concept of most powerful test and analyze the samples based on most powerful test like t' , F' and chi-square	K4
CO4	Understand the concepts of probability and apply to solve real life situations	K3,K2
CO5	Evaluate numerical solutions of algebraic equations and compute the integrals by using the appropriate technique	K5

Mapping

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

H-High; M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	Statistics: Measure of Central Tendency: Mean, Median, Mode, Geometric Mean, Harmonic Mean - Measure of Dispersion - Quartile Deviation, Standard Deviation, Coefficient of Variation – Correlation: Definition, Karl Pearson Co-efficient of Correlation, Rank Correlation, Bivariate Correlation – Regression: Lines of Regression, Co-efficient of Regression.	12
Unit II	Distributions: Binomial, Poisson, Normal and Continuous Distribution - Moment - Moment Generating Functions of Binomial, Poisson and Normal Distribution- Fitting of Binomial, Poisson and Normal Distribution – Problems - Geometric Distribution, Multinomial Distribution, Power Series Distribution, Uniform Distribution, Gamma Distribution, Pearson Distribution (Definition only)	12
Unit III	Large Sample test: Standard error- Test of Significance of Large Samples – Tests for (i) single proportion (ii) Difference of two proportions (iii) difference of two means (iv) difference of two standard deviations. Small sample test based on t, – t-test for (i) single mean (ii) Difference of two means (iii) Observed sample correlation co-efficient. F- Variance Ratio Test – chi square test of goodness of fit	12
Unit IV	Probability: Permutation, combination, trail, event, sample space, mutually exclusive cases, exhaustive events, Independent events, and dependent events, simple and compound events. Measurement: Classical, relative frequency, theory of probability, Limitations, personalistic view of probability and Axiomatic Approach of probability, addition and multiplication theorem, odds, miscellaneous illustrations question – Bayes theorem.	12
Unit V	Numerical Methods: Gauss-Jordan direct method, Gauss-Seidal iterative method for linear algebraic system – Bisection, Newton's Rapshon method for polynomial system-Newton forward and backward interpolation-Trapezoidal rule-Simpson 1/3 rule and 3/8 rule for Numerical Integration.	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Direct Instruction, Digital Presentation, Digital Assignments, Online Quiz, Group Talk (APS), Numerical Exercises.
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Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)		
Course Code:	21UCS103			Title :	Batch :	2021-2024	
Hrs/Week:	5	Tutorial Hrs./Sem	75	Core Lab I: Programming Lab in C & C++	Semester:	I	
					Credits:	02	

Course Objective

The purpose of this course is to enrich knowledge in the field of programming using C and C++ language. The students will be able to analyze and improve their problem solving skills in C and also to enhance problem solving and programming skills using OOPs concepts in various domains.

Course Outcomes (CO)

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

CO1	To implement different operations on arrays and use functions in C to solve any problems and to apply the basic concepts of C++ such as function, friend functions and array of Objects to solve a particular problem.	K3
CO2	To evaluate the C program that uses pointers, structures and files and to analyze programs Using more advanced OOPs concepts such as Constructor/Destructor, Operator overloading, Inheritance, and Polymorphism.	K4
CO3	To validate programs with pointers and arrays, perform pointer arithmetic, and pre Processor in C and also to validate programs using Dynamic memory allocation and Virtual functions in C++.	K5

Mapping

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	M	H	H	H	H	H	H	M	H	H
CO2	H	M	M	H	H	H	H	H	H	H	H	H
CO3	M	M	H	H	M	H	H	M	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
	SET A • C Program to find the greatest number among <code>__n</code> numbers. • C Program to find Prime numbers between a given ranges. • C Program for finding Sum of individual digits. • C Program to display a set of numbers in Ascending order. • C Program to find whether a given string is a palindrome or not • C Program to find the transpose of a matrix. • C Program to illustrate the concept of structures. • C++ Program to generate Fibonacci series for <code>__n</code> numbers. • C++ Program to illustrate the concept of class and object. • C++ Program to illustrate the concept of function with return statement. • C++ Program to illustrate the concept of Inline and Friend function. • C++ Program to illustrate the concept of function overloading. • C++ Program to illustrate the concept Array of Object. • C++ Program to illustrate the concept of objects as Function argument and returning by objects. • C++ Program to illustrate the concept of Constructors and Destructors. SET B • C Program for Binary search. • C Program to find a Mean, median & mode for given values. • C Program to calculate Matrix multiplication. • C Program to count vowels, consonants, white spaces in a given sentence. • C Program to illustrate the concept of Pointers. • C Program to create and processing a random access file. • C Program for command line arguments • C++ Program to illustrate the concept copy constructor. • C++ Program to illustrate the concept overloading binary operators. • C++ Program to illustrate the concept of single inheritance. • C++ Program to illustrate the concept of multiple inheritances. • C++ Program to illustrate the concept pointers to objects and to derived objects. • C++ Program to illustrate the concept virtual function. • C++ Program to illustrate working with single file. • C++ Program to illustrate working with multiple files INTERNAL MARK (50 Marks) EXTERNAL MARK (50 Marks)	75

Programme Code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS2A2	Title:	Batch :	2021-2024
		Allied-2:	Semester	II
Hrs/Week:	4	Discrete Mathematical Structure Level-II	Credits:	4

Course Objective

On successful completion of the course the students are able to understand the concepts and principles of relations, functions, set theory, partial ordering, mathematical logic, and formal languages and graph theory and trees.

Course Outcomes (CO)

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

K1	CO1	To keep in mind about the fundamental ideas and notation of discrete mathematics with examples
K2	CO2	To get the idea of relations, types of relations and functions, types of functions
K3	CO3	To analyze the formal language such as formation of words and monoids with examples
K4	CO4	To Understand some basic properties of graphs, types of graphs, trees and be able to relate these to practical examples

MAPPING

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	PSO1	PSO2
COs												
CO1	H	M	H	M	H	H	H	L	M	M	H	M
CO2	H	H	M	H	M	L	H	H	M	H	M	H
CO3	H	M	H	M	H	H	M	H	M	H	H	M
CO4	H	H	H	M	H	M	M	H	H	H	H	M

H: High M: Medium L: Low

Syllabus

Units	CONTENTS	Hours
UNIT I	Set Theory: -Introduction-Set & its Elements-Set Description-Types of sets, Venn-Euler Diagrams- Set operations & Laws of set theory-Fundamental products-partitions of sets-Minsets- Algebra of sets and Duality- The Inclusion and Exclusion principle	12
UNIT II	Mathematical logic: - Introduction- Statements and Notation-Connectives-Negation- Conjunction-Disjunction-Statement formulas and Truth tables-Conditional and Biconditional-Tautologies, Equivalence of Formulas-Duality Law-Tautological Implications-Normal Forms-DNF-CNF-PDNF-PCNF-Predicate Calculus-Predicates-The statement function, variables, and Quantifiers-Predicate Formulas-Free and Bound Variables-The Universe of Discourse.	13

UNIT III	Relations: – Introduction- Cartesian Product of Sets- Binary Relations – <i>Set operations on relations</i> -Types of Relations – Partial order relations – Equivalence relation – Composition of relations. Functions: – Types of functions – Invertible functions – Composition of functions.	11
UNIT IV	Algebraic Structure: Semigroups & monoids- Homomorphism of semigroups and monoids- sub semigroups and submonoids- <i>groups</i> Formal languages: Basic definitions-phase structure grammar- types of phase structure grammar-Worked examples	11
UNIT V	Graph Theory: – Basic concepts of Graph theory-Basic Definitions-Paths, Reachability and Connectedness- Matrix Representation of graphs-Trees-Storage representation and Manipulation of Graphs- Trees: Their Representation and Operations- <i>List structures and Graphs</i>	13
	Total Hours	60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and Talk, Quiz, Assignments, Group Task

TEXT BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	J.K. Sharma (Unit I & III)	Discrete mathematics	Macmillan India Ltd, Second Edition	2005
2	J.P.Tremplay & R. Manohar (Unit II & V)	Discrete Mathematical structures with Applications to computer Science	Tata Mc Graw-Hill Companies	2008
3	T.Veerarajan (Unit IV)	Discrete mathematics	Tata McGraw Hill	2007

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Dr M. K. Venketaramen, Dr N.Sridharan, N.Chandarasekaran	Discrete Mathematics	The National publishing Company Chennai.	2006
2	V. Sundaresan, K.S. Ganapathi Subramanian, K. Ganesan	Discrete Mathematics	A.P.Publications, Sirkali	2006
3	RaniSironmani	Formal Languages	The Christian Literature Society, First Edition	1984

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21UCS307			Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core V: .Net Technologies	Semester:	III
					Credits:	04

Course Objective

The course gives introduction to the .Net framework, library and various applications involved in it. It enables the students to learn and develop Windows and Web applications for the .NET platform.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic concepts and applications of database systems and SQL.	K1
CO2	To understand the relational database theory, and be able to write relational algebra expressions for queries	K2
CO3	To apply design principles using the E-R method and normalization approach	K3
CO4	To interpret SQL interface of a relational DBMS package to create, secure, populate, maintain, and query a database and PL/SQL programming using Triggers and Cursors.	K4
CO5	To attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	K5

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	M	M	M	H	H	M	M	M
CO2	H	H	H	H	M	H	H	H	H	M
CO3	H	M	S	H	H	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	C# LANGUAGE BASICS :C# and the .NET framework - C# basics - Objects and types - Inheritance - Arrays – Operators and casts	10
Unit II	C# ADVANCED FEATURES : Delegates and events - Strings and regular expressions - Generics - Collections – Memory management and pointers - Errors and exceptions	10
Unit III	BASE CLASS LIBRARIES AND DATA MANIPULATION: Tracing and events - Threading and synchronization - .Net security - Localization –Managing the file system - Basic network programming	11
Unit IV	DATABASE AND WEB SERVICES: Window based applications - Data access with .NET - basics of ASP .NET - Introduction to web services	11
Unit V	.NET FRAMEWORK: Architecture - Assemblies - Shared assemblies - CLR hosting - Reflection	10
	Total Contact Hrs	52

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Christian Nagel	Professional C# 2005 with .NET 3.0	Wiley India	2007

Reference Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ian Gariffiths, Mathew Adams, Jesse Liberty	Programming C# 4.0	O'Reilly, Fourth Edition	2010

Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS309	Title :	Batch :	2021-2024
		Core VII: System software and Operating System	Semester:	III
Hrs/Week:	4		Credits:	04

Course Objective

To objective of the course is to enable the students to understand the concepts of operating system including process management, storage management, scheduling and windows.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Know the program generation and program execution activities in detail	K1
CO2	Understand the concepts of Macro Expansions and Gain the knowledge of Editing processes	K2-K3
CO3	Remember the basic concepts of operating system	K1
CO4	Understand the concepts like interrupts, deadlock , memory management and file management	K2
CO5	Analyze the need for scheduling algorithms and implement different algorithms used for representation, scheduling, and allocation in DOS and UNIX operating system.	K1-K4

Mapping

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

H - High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	Introduction to system software: Introduction–System Software and machine architecture. Loader and Linkers: Basic Loader Functions - Machine dependent loader features –Machine independent loader features - Loader design options.	12
Unit II	Machine and compiler: Machine dependent compiler features - Intermediate form of the program - Machine dependent code optimization - Machine independent compiler features - Compiler design options - Division into passes – Interpreters – p-code compilers - Compiler-compilers. Unit:	12
Unit III	OPERATING SYSTEM: What is an Operating System? – Process Concepts: Definition of Process - Process States - Process States Transition – Interrupt Processing – Interrupt Classes . Storage Management: Real Storage: Real Storage Management Strategies – Contiguous versus Non-contiguous storage allocation – Single User Contiguous Storage allocation- Fixed partition multiprogramming – Variable partition multiprogramming. .	12
Unit IV	Virtual Storage: Virtual Storage Management Strategies – Page Replacement Strategies – Working Sets – Demand Paging – Page Size. Processor Management: Job and Processor Scheduling: Preemptive Vs Non-preemptive scheduling – Priorities – Deadline scheduling.	12
Unit V	Device and Information Management Disk Performance Optimization: Operation of moving head disk storage – Need for disk scheduling – Seek Optimization. File and Database Systems: File System – Functions – Organization – Allocating and freeing space – File descriptor – Access control matrix.	12
	Total Contact Hrs	60

Pedagogy and Assessment Methods:

Seminar, Power Point Presentation, Chalk and talk, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Leland L.Beck, System Software	An Introduction to Systems Programming	Pearson	Third Edition
2	H.M. Deitel	Operating Systems	Perason	2nd Edition ,2003

Programme code:	B.Sc	Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS310	Title :	Batch :	2021-2024
		Core Lab III:Programming Lab in .Net Technologies	Semester:	III
Hrs/Week:	5		Credits:	02

Course Objective

This Lab course will help students to achieve the following objectives:

1. Introduce to .Net IDE Component Framework.
2. Programming concepts in .Net Framework.
3. Creating website using ASP.Net Controls.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Create user interactive web pages using ASP.Net.	K3
CO2	To Create simple data binding applications using ADO.Net connectivity	K4
CO3	Performing Database operations for Windows Form and web applications	K5

Mapping

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	M	M	M	H	H	H	L	M	M
CO2	H	H	M	M	H	H	H	M	M	L	M	H
CO3	H	H	M	M	M	M	H	H	H	H	M	M

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
	SET A • Develop a project for performing arithmetic, relational and logical operators. • Develop a project for demonstrating polymorphism abstraction • Develop a project for demonstrating switch statements. • Create a form that is the main window of a program using window class. • Develop an application which is similar to notepad using menus • Develop an application for facilitating purchasing order . • Develop an application which is similar to login form. • Develop an application using tree view control • Develop an application using font dialog control • Develop an application using color dialog control. • Develop an application to display the file selected by the user in a web browser control SET B • Create a form which displays the given inputs in the form of a tree view Structure. • Develop a project for implementing exception handling in c#. • Develop an application for billing system in coffee shop • Develop an application for fruits billing • Develop an application using the data reader to read from a database. • Develop a project which displays the student information in the relevant fields from the database which already exists. • Design an application with simple bulleted list control. • Design an application for selecting a single day in the calendar control.. • Design an application by using the new scroll bar feature with the panel server control. INTERNAL MARK (25 Marks) EXTERNAL MARK (25 Marks)	75

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE

Programme Code:	B.Sc. CS			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:		21UCS517		Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core XI: Linux and Shell Programming	Semester:	V
					Credits:	3

Course Objective

To inculcate knowledge on open source Linux operating system and enrich the programming skills in shell programming, processes, signals and communication.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Remember the history and fundamentals of Linux operating system	K1
CO2	Understand shell scripts, file and directory related commands	K2
CO3	Apply the commands for systems programming including file system programming and process management	K3
CO4	Analyze the file system, devices and backup management	K4
CO5	Evaluate the network administration services	K5

Mapping

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

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	Introduction: Introduction to Linux - Linux Distributions - Operating Systems and Linux - History of Linux and Unix-Linux Overview - Open Source Software - Linux Software – Online Linux Information Sources - Linux Documentation. Accessing Your Linux System - Command Line Interface. The Shell: The Command Line-History –Filename Expansion: *, ?, [] - Standard Input/Output and Redirection-Pipes-Redirecting and Piping the Standard Error: >&, 2> - Jobs: Background, Kills and Interruptions-Ending Processes: ps and kill – nice command - The C shell: Command Line Editing and History-The TCSH Shell-The Z-shell.	12

Unit II	The Linux Shell And File Structure: The Shell Scripts And Programming: Shell Variables-Shell Scripts: User –Defined Commands-Environment Variables and Subshells: export and setenv-Control Structures-TCSH/C Shell Control Structures. Shell Configuration: Shell Initialization and Configuration Files-Configuration Directories Files-Aliases-Controlling Shell Operations. Linux Files, Directories and Archives: Linux Files-The File Structure-Listing, Displaying and Printing Files: ls, cat, more, less and lpr - Managing Directories: mkdir, rmdir, ls, cd and pwd-Files and Directory Operations: find, cp, mv, rm and ln –The mtools Utilities: msdos - Archiving and Compressing Files.	12
Unit III	Pipes & Filters: sed, awk, sort, gawk, uniq, head, tail, wc, grep, tac and nl commands. System Administration: Basic System Administration: Superuser Control: The Root User-System Time and Date-Scheduling Tasks: cron - System Runlevels: telinit, initab and shutdown-System Directories-Configuration Directories and Files-System Logs: /var /log and syslogd. Managing Users: Adding and Removing Users with useradd, usermod and userdel-Managing Groups—Controlling Accesses To Directories and Files: chmod.	12
Unit IV	File Systems: File Systems-File System Hierarchy Standard(FHS) – Journaling - Mounting File System Automatically: /etc/fstab - Mounting File Systems Manually: mount and umount - Creating File Systems: mkfs, mke2fs, mkswap, parted and fdisk. Devices and Modules: The sysfs File System: /sys - udev: Device Files - Hardware Abstraction Layer: HAL- Manual Devices - Installing and Managing Terminals and Modems - Input Devices.	12
Unit V	Backup Management: Individual Backups: archive and rsync – BackupPC – Amanda-Backups with dump and restore Network Administration Services: Administering TCP/IP Networks-TCP/IP Protocol Suite-Zero Configuration Networking(zeroconf): Avahi and Link - IPv4 and IPv6 - TCP/IP Network Addresses - IPv6 Addressing- IPv6 and IPv4 Coexistence Methods-TCP/IP Configuration Files- Domain Name Service (DNS) - Network Interfaces and Routes: ifconfig and route.	12
Total Contact Hrs		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation,
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Assessment Methods:

Seminar, Online Quiz, Digital Assignments, Group Task: GD

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Petersen and Richard	LINUX: The Complete Reference	McGraw Hill, Sixth edition	2007
2	Richard Stones, Neil Matthew	Beginning Linux Programming	Wiley, Fourth edition	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Richard Blum and Christine Bresnahan	Linux Command Line and Shell Scripting Bible	Wiley, Fourth edition	2021
2	Mark.G.Gobell	Red Hat LINUX-Reference Manual	Pearson Education, First Edition	2003

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS5E2			Title:	Batch :	2021-2024
Lecture Hrs/Week:	5	Tutorial Hrs./Sem.	75	Core Elective-I: Data Engineering with Google Cloud	Semester:	V
					Credits:	5

Course Objective

On successful completion of the course the students are enabling to data-driven decision making by collecting, transforming, and publishing data.

Course Outcomes (CO)

CO1	To remember the concepts of Data and storage.	K1
CO2	To understand the idea of designing data models	K2
CO3	To Apply Data Engineering Concepts in building Data Processing Systems	K3
CO4	To Analyze the Operationalizing of Data Processing Systems.	K4
CO5	To evaluate the Data Processing System.	K5

Mapping

P0/POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO												
CO1	H	H	H	M	M	H	M	L	M	H	M	L
CO2	M	H	H	M	M	M	M	H	M	M	M	M
CO3	H	M	H	M	M	H	H	L	M	H	M	H
CO4	H	M	M	M	H	H	H	M	L	M	M	H
CO5	M	M	H	H	H	H	M	M	M	H	H	M

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

Syllabus

Units	Contents	Hrs
Unit I	Selecting the appropriate storage technologies: Mapping storage systems to business requirements-Data modeling-Tradeoffs involving latency-throughput, transactions-Distributed systems-Schema design. Designing data pipelines : Data publishing and visualization-Batch and streaming data-Online vs. batch predictionsJob automation and orchestration. Designing a data processing solution: Choice of infrastructure System availability and fault tolerance-Use of distributed systems- Capacity planning, Hybrid cloud and edge computing-Architecture options-event processing. Migrating data warehousing and data processing: Awareness of current state and how to migrate a design to a future state migrating from on-premises to cloud validating a migration.	15
Unit II	Building and operationalizing storage systems: Effective use of managed services (Cloud Bigtable, Cloud Spanner, Cloud SQL, BigQuery, Cloud Storage, Cloud Datastore, Cloud Memorystore)-Storage costs and performance-Lifecycle	15

	management of data. Building and operationalizing pipelines: Data cleansingBatch and streaming-Transformation Data acquisition and import integrating with new data sources. Building and operationalizing processing infrastructure: Provisioning resources Monitoring pipelines Adjusting pipelines testing and quality control.	
Unit III	Operationalizing machine learning models: Leveraging pre-built ML models as a service ML APIs (e.g., Vision API, Speech API)-Customizing ML APIs (e.g.,AutoML Vision, Auto ML text) Conversational experiences (e.g., Dialogflow).Deploying an ML pipeline ingesting appropriate data retraining of machine learning- models (Cloud Machine Learning Engine, BigQuery ML, Kubeflow, and Spark ML) Continuous evaluation. Choosing the appropriate training and serving infrastructure: Distributed vs. single machine Use of edge compute Hardware accelerators (e.g., GPU, TPU).	15
Unit IV	Measuring, monitoring, and troubleshooting machine learning models: Machine learning terminology (e.g., features, labels, models, regression, classification, recommendation, supervised and unsupervised learning, evaluation metrics)-Impact of dependencies of machine learning modelsCommon sources of error (e.g., assumptions about data) Designing for security and compliance: Identity and access management (e.g., Cloud IAM)-Data security (encryption, key management)-Ensuring privacy (e.g., Data Loss Prevention API)Legal compliance (e.g., Health - Insurance Portability and Accountability Act (HIPAA)-Children's Online Privacy Protection Act (COPPA)-FedRAMP-General Data Protection Regulation (GDPR))	15
Unit V	Ensuring scalability and efficiency: Building and running test suites Pipeline monitoring (e.g., Stackdriver)-Assessing-troubleshooting and improving data representations and data processing infrastructure-Resizing and autoscaling resources Ensuring reliability and fidelity: Performing data preparation and quality control (e.g., Cloud Dataprep)-Verification and monitoringPlanning, executing, and stress testing data recovery (fault tolerance, rerunning failed jobs, performing retrospective re-analysis)-Choosing between ACID, idempotent, eventually consistent requirements Ensuring flexibility and portability: Mapping to current and future business requirements-Designing for data and application portability (e.g., multi-cloud, data residency requirements)-Data staging-cataloging and discovery.	15
	Total Contact Hrs	75

Pedagogy

DirectInstruction, FlippedClass, DigitalPresentation

Assessment Methods

Seminar, Quiz, Assignments, GroupTask

TEXT BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Dan Sullivan	Professional Data Engineer Study Guide	SYBEX Imprint, First Edition	2020

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21UCS5E3			Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Core Elective I: Mobile Application Development	Semester:	V
					Credits:	4

Course Objective

To understand the need and characteristics of mobile application and to design the right user interface of mobile application

To understand the design issues in the development of mobile application and to develop mobile applications using various tools and platforms

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals and characteristics of mobile application and apply the right user interface for designing mobile application	K2, K3
CO2	Implement mobile application using UI toolkits and frameworks and also implement android application with multimedia support	K3
CO3	Design a mobile application that is aware of the resource constraints of mobile devices.	K5
CO4	Develop web based mobile application that accesses internet and location data	K5
CO5	Implement android application to use telephony for SMS communication	K3

Mapping

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

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	INTRODUCTION Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Device Profiles – Frameworks and Tools.	15
Unit II	USER INTERFACE Generic UI Development – Designing the Right UI – Multimodal and Multichannel UI – Gesture Based UI – Screen Elements and Layouts – Voice XML	15
Unit III	APPLICATION DESIGN Memory Management – Design Patterns for Limited Memory – Work Flow for Application Development – Java API – Dynamic Linking – Plug-ins and Rule of Thumb for using DLLs – Concurrency and Resource Management.	15
Unit IV	APPLICATION DEVELOPMENT I Mobile OS: Android, iOS – Android Application Architecture – Android basic Components – Intents and Services – Storing and Retrieving data – Packaging and Deployment – Security and Hacking.	15
Unit V	APPLICATION DEVELOPMENT II Communication via the Web – Notification and Alarms – Graphics and Multimedia: Layer Animation, Event Handling and Graphics Services – Telephony – Location Based Services.	15
	Total Contact Hrs	75

Pedagogy and Assessment Methods:

DirectInstruction, FlippedClass, DigitalPresentation
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Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Reto Meier	Professional Android 4 Application Development	Wiley	2012
2	Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura	Programming Android	O'Reilly	2012
3	Alasdair Allan	iPhone Programming	O'Reilly	2010

Programme Code:	B.Sc. CS			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:		21UCS520		Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab VII: Linux and Shell Programming Lab	Semester:	V
					Credits:	3

Course Objective

The objective of this course is to make effective use of Linux utilities and shell scripting language to solve problems

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Develop shell scripts for simple applications.	K3, K4, K5
CO2	To Develop programs to create and manage processes.	K3, K4, K5
CO3	To Develop programs for system administration	K3, K4, K5

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	-	-	H	H	M	-	M	H	H	H
CO2	H	H	-	-	H	H	H	-	M	H	H	H
CO3	H	H	-	-	H	H	H	-	M	H	H	H

H-High; M-Medium; L-Low

Content	Hrs
SET A - Write programs for various commands like cat, tail, head, sort, grep, cut, paste, join, etc., - Write programs using file related commands. - Write programs using directory related commands. - Write programs to create user, group and assign various permissions to access a directory - Write a shell script program to display list of users currently logged in & process. - Write a shell script program to develop a scientific calculator. - Write a shell script to compute GCD & LCM of two numbers - Write a shell script program to display telephone tariff of a customer. - Write a shell script program to search whether element is present in the list or not. - Write a Shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it. SET B - Write a shell-script that takes a command line argument and reports on whether it is a directory, a file or something else. - Write a shell script that displays a list of all files in the current directory to which the user has read, write and execute permissions - Write a shell script program to change the access mode of all the files and directories within the specified directory. - Write a shell script to count number of lines in a file that does not contain vowels - Write a shell script to find the no of characters, words and lines in a file - Write a shell script program to copy contents of one file to another using command line. - Write a shell script program to display the process attributes. - Write a shell script program to change the priority of process and terminate. - Write a shell script program to allow only user1, user2, user3 to use crontab - Write a shell script program to create an archive by bundling files and directories together, and extract them into a specific directory. INTERNAL MARK (50 Marks) EXTERNAL MARK (50 Marks)	60
Total Contact Hrs	60

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

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS6E4			Title:	Batch :	2021-2024
Lecture Hrs/Week:6	6	Tutorial Hrs./ Sem.	90	Core Elective -II: Artificial Intelligence and Machine learning	Semester:	VI
					Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

CO1	To recall the basic logical searches, learning algorithms and improve decision making systems.	K1
CO2	To Summarize the idea about knowledge representation and reasoning	K2
CO3	To illustrate new knowledge with probabilistic reasoning solutions	K3
CO4	To Analyze Decision making system and its different process	K4
CO5	To evaluate the learning skills with many observations and machine learning algorithms	K5

Mapping

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

H-High; M: Medium L: Low

Syllabus

Units	Contents	Hrs
Unit I	INTRODUCTION: The Introduction of AI - The History of AI - Intelligent agents- Agent based system. PROBLEM SOLVING: State Space models - Searching for solution - Uninformed/Blind search - Informed/ Heuristic search - A* search - Hill- climbing search - Meta Heuristic: Genetic Algorithm - Adversary based search : Minimax - Expectimax – Alpha Beta pruning - Constraint satisfaction problem -Backtracking search	18
Unit II	KNOWLEDGE REPRESENTATION AND REASONING: Knowledge representation - Logics - bivalent logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference	18
Unit III	UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING: Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network - Probabilistic reasoning over time – Inference in temporal models - Hidden Markov Models – Dynamic Bayesian Networks	18
Unit IV	DECISION-MAKING: Basics of utility theory, Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policy iteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making	18

Unit V	Machine learning: Introduction- Probability distributions: Binary variables, Multinomial variables. Neural networks –feed forward network function-Error propagation. Kernel methods-radial bias function networks .Graphical models-Bayesian networks-Discrete variables, linear Gaussian model. Mixture models and EM-K means clustering-.Combining models-Boosting Algorithm.	18
	Total Contact Hrs	90

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task

TEXT BOOKS

S.NO	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Stuart Russell and Peter Norvig	Artificial Intelligence: A Modern Approach	Pearson Education	2014
2.	David Poole and Alan Mackworth,	Artificial Intelligence: Foundations of Computational agents	Cambridge University Press,	2017
3	Christopher M.Bishop	Pattern Recognition and Machine Learning	Springer	2013.

REFERENCE BOOKS

S.NO	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1	C. S. Krishnamoorthy, S. Rajeev	Artificial Intelligence and Expert Systems for Engineers	CRC Press,	1996
2	Nils J. Nilsson	The Quest for Artificial Intelligence: A History of Ideas and achievements	Cambridge University press	2010.
3.	Alpaydin Ethem,	Introduction to Machine Learning	Massachusetts Institute of Technology Press,	2009.

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS6E5			Title:	Batch :	2021-2024
Lecture Hrs/Week:	6	Tutorial Hrs./ Sem.	90	Core Elective-II: Front-End Web Development with React	Semester:	VI
					Credits:	5

Course Objective

On successful completion of the course the students are able to build a real world application along the way in plain react without complicated tooling.

Course Outcomes (CO)

CO1	To remember the concepts of front end design.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To Apply essential hacks and simple techniques to solve React application development challenges.	K3
CO4	To Analyze the to wield complex topics such as Webpack and server-side rendering..	K4
CO5	To Learn to maximize the performance of React applications	K5

Mapping

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

H-High; M: Medium; L: Low

Syllabus

Units	Contents	Hrs
Unit I	Introduction to React101: Structure-Objective-React is Component based-React is declarative-Quick JS version-Classes-Closures-More JavaScript.	18
Unit II	Setting up react: Structure-objective-choosing an text editor-Setting up nNode and NPM-Setting up React projects-JSX-Moving to type script.	18
Unit III	Components: Structure-Objective-About the Component-class versus functional component-Functional Component-Class Component-Life cycle management.	18
Unit IV	Introduction to Next.JS-Structure-Objective-what is Next.JS-Istallation-Next.JS default-pages-routing-Next.JS Component-Important of CSS files.	18

Unit V	Bleeding edge React: Structure-Objective-How does React work- Concurrent mode-Opting in Concurrent mode-suspense(code fetching)-Suspense(Data fetching).	18
	Total Contact Hrs	90

Pedagogy

DirectInstruction, FlippedClass, DigitalPresentation
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Assessment Methods

Seminar, Quiz, Assignments, GroupTask

TEXT BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Mehul Mohan	Advanced Web Development with React: SSR and PWA with Next.js using React with advanced concepts	First Edition	2020

REFERENCE BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Robin Wieruch	The Road to Learn React: Your Journey to Master Plain Yet Pragmatic React.Js	BPB Publications, First Edition	2018.
2	Carlos Santana Roldán	React Cookbook: Create dynamic web apps with React using Redux, Webpack, Node.js, and GraphQL	Packt Publishing Ltd., Kindle Edition	2018.

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

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:		21UCS6E6		Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	6	Tutorial Hrs./Sem.	90	Core elective II: MongoDB	Semester:	VI
					Credits:	4

Course Objective

To understand fundamentals of NoSQL and apply MongoDB (NoSQL) for Data Analysis using CURD and User Management.

Course Outcomes(CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand NoSQL database Design multiple tables, and using group queries.	K3
CO2	Design a database based on a data model normalization to a specified level	K4
CO3	Understand and apply various operators and queries in Mongo DB	K3
CO4	Develop a text processing skill set and able to apply in creation of	K4,K5
CO5	Design a secure database and analyze with security protocols	K4, K6

Mapping

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

H-High; M-Medium; L-Low

Units	Content	Hrs
Unit I	NoSQL : Indexing and Hashing – Query Processing – Transaction Processing – Concurrency Control and Recovery - Advanced Database Concepts and Emerging Applications: Distributed Databases – Object Oriented Databases - Object Relational Databases- Data mining and Data Warehousing – Big Data - Big Databases- SQL–NoSQL Tradeoffs–CAP Theorem–Eventual Consistency - NoSQL–database types – Document Oriented – Columnar – Graph – Key/Value Pair - NoSQL database, design for performance / quality parameters, documents and information retrieval .	18
Unit II	MongoDB Introduction : MongoDB- Introduction - MongoDB – Need – MongoDB Vs RDBMS – MongoDB- Driver Installation – Configuration – Import and Export – MongoDB Server Configuration - Data Extraction Fundamentals - Intro to Tabular Formats - Parsing CSV -Parsing XLS with XLRD- Parsing XML - Intro to JSON - Getting Data into MongoDB - MongoDB- CURD – Database Creation – Update – Read – Delete	18
Unit III	MongoDB Operators : Using mongoimport -Operators like \$gt, \$lt, \$exists, \$regex -Querying Arrays and using \$in and \$all Operators -Changing entries: \$update,\$set, \$unset - Data Analysis - Field Queries - Projection Queries- Limiting – Sorting - Aggregation - Examples of Aggregation Framework - The Aggregation Pipeline - Aggregation Operators: \$match, \$project, \$unwind, \$group	18
Unit IV	Indexes and Advanced MongoDB: Indexes – Create – Find – Drop – Backup – MongoDB – Relationships – Analyzing Queries – MongoDB Objectid MapReduce – MongoDB - Text Processing - Regular Expression – Case Studies – Text processing of large datasets, Map Reduce using MongoDB - Data Security – Performance – Data Safety – Resource Utility – High – Advanced MongoDB: Map Reduce – MongoDB - Text Processing -	18
Unit V	Contemporary Issues: Availability User Management – MongoDB Data Replication in Servers – Data Sharding – MongoDB Data Security – Performance – Data Safety – Resource Utility – High Availability Expert lectures, online seminars - webinars	18
	Total Contact Hrs	90

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS6E7			Title:	Batch :	2021-2024
Lecture Hrs/Week:	6	Tutorial Hrs./Sem.	90	Core Elective-III: Information Retrieval	Semester:	VI
					Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

CO1	To remember the concepts of artificial intelligence and Information retrieval systems.	K1
CO2	To understand the idea of retrieval models with similarity measures and ranking	K2
CO3	To Apply Queries using categorization and clustering	K3
CO4	To Analyze the filtering techniques using web search.	K4
CO5	To evaluate the extraction and integration of data with many applications.	K5

Mapping

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

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	INTRODUCTION: Overview of IR Systems - Historical Perspectives - Goals of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR. TEXT REPRESENTATION: Statistical Characteristics of Text: Zipf's law; Porter stemmer; morphology; index term selection; using thesauri. Basic Tokenizing, Indexing: Simple tokenizing, stop-word removal, and stemming; inverted indices; Data Structure and File Organization for IR - efficient processing with sparse vectors.	18
Unit II	RETRIEVAL MODELS: Similarity Measures and Ranking - Boolean Matching – Extended Boolean models - Ranked retrieval - Vector Space Models -, text-similarity metrics - TF-IDF (term frequency/inverse document frequency) weighting - cosine similarity, Probabilistic Models, Evaluations on benchmark text collections.	18

Unit III	QUERY PROCESSING: Query Operations and Languages- Query expansion; Experimental Evaluation of IR: Performance metrics: recall, precision, and F-measure. TEXT CATEGORIZATION AND CLUSTERING: Categorization :Rocchio; Naive Bayes, KNN; Clustering: Agglomerative clustering; k-means; Expectation Maximization (EM); Dimension Reduction: LSI, PCA	18
Unit IV	INFORMATION FILTERING TECHNIQUES: Introduction to Information Filtering, Relevance Feedback-Applications of Information Filtering; RECOMMENDER SYSTEMS: Collaborative filtering and Content-Based recommendation of documents and products. WEB SEARCH: IR Systems and the WWW - Search Engines: Spidering, Meta Crawlers; Link analysis : Hubs and Authorities, Google PageRank, Duplicate Detection	18
Unit V	INFORMATION EXTRACTION AND INTEGRATION: Extracting data from text; Basic Techniques: NE Recognition, Co-reference Resolution, Relation Extraction, Event Extraction; Extracting and Integrating specialized information on the web, Web Mining and Its Applications.	18
Total Contact Hrs		90

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods

Seminar, Quiz, Assignments, Group Task
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TEXT BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze	Introduction to Information Retrieval	Cambridge University Press	2012.
2	Ricardo Baeza-Yates and Berthier Ribeiro-Neto	Modern Information Retrieval	Pearson Education,	2010.
3	Croft B., Metzler D., Strohmman T	Information Retrieval in Practice	Pearson Education,	2010

REFERENCE BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Stephan Buttcher, Charles L. A. Clarke and Gordon Gormack,.	Information Retrieval Implementing and Evaluating Search Engines	MIT Press	2010.
2	Francesco Ricci, Lior Rokach, Bracha Shapira, Paul B. Kantor	Recommender Systems –	Handbook	2011.
3	Anand Rajaraman and Jeffrey Ullman	Mining Massive Data sets	Cambridge University Press,	2014.

Programme code:	B.Sc			Programme Title :	Bachelor of Science (Computer Science)	
Course Code:	21UCS6E8			Title:	Batch :	2021-2024
				Core Elective-III :	Semester:	VI
Lecture Hrs/Week:	6	Tutorial Hrs./Sem.	90	HTML, JavaScript and JQuery For web designing	Credits:	5

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

CO1	To remember the concepts of basic web designing languages.	K1
CO2	To understand the idea of designing and scripting web pages	K2
CO3	To ApplyQueries using categorization and clustering	K3
CO4	To Analyze the validation and querying techniques using Javascript and jQuery.	K4
CO5	To evaluate the web forms for different applications.	K5

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P010	PSO1	PSO2
CO1	H	H	H	L	M	M	M	M	H	M	H	H
CO2	H	M	H	L	H	M	M	H	H	M	H	H
CO3	H	M	H	L	H	H	M	H	H	L	H	H
CO4	H	M	H	L	H	H	M	H	H	H	H	H
CO5	H	M	H	L	H	M	H	M	H	H	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Contents	Hrs
Unit I	HTML : Introduction – Getting started – Creating and saving an HTML document – Document Layout of HTML Page – HTML elements – Some other formatting Styles – Hypertext Links. CSS: CSS syntax and Style-Class Selectors-Id –Selectors-Cascading-Style attribute-Style Container-CSS Properties-Color-Font-Text-Border-Element Box-Padding Property-Margin Property.	18
Unit II	HTML Tables and CSS Layout: Table Elements-Formatting a Data Table-CSS Pseudo class Selectors- thead and tbody elements-Cell spanning-Web Accessibility –CSS Display properties with Table values- Links and Images: Introduction- a Element-Relative URLs-index.html file-webdesign-Navigation within a Webpage-CSS for Links-img element.	18

Unit III	Javascript: Introduction-History of Javascript-Hello World Webpage-Buttons-Funtions –DOMs-Forms and Event Handlers-window object-if Statement-Strings-Numbers and Input Validation. Loops-Additional Controls-Manipulating CSS with Javascript.	18
Unit IV	JS Arrays-JS Array Methods-JS Array Sort-JS Date-JS Switch-JS Type Conversion-Java Script Arrays-Math,Number,Date objects- Strings-Form Validation.	18
Unit V	jQuery Overview-Basics-Selectors-Attributes-jQuery Traversing-Events-jQuery Ajax-jQuery UI: Interactions-Widgets-Theming	18
	Total Contact Hrs	90

Pedagogy

DirectInstruction, FlippedClass, DigitalPresentation

Assessment Methods

Seminar, Quiz, Assignments, GroupTask

TEXT BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	John Dean	Web Programming with HTML5, CSS, and JavaScript	Jones &Bartlett Learning, Fifth Edition	2018
2	John Pullock	Java Script-A Beginners Guide	Tata McgrawHill, Fifth Edition	2020
3	Jonathan Chaffer, Karl Swedberg	jQuery	Packt, Fourth Edition	2010

REFERENCE BOOKS

S.NO.	AUTHOR	TITLE OF THE PAPER	PUBLISHER / EDITION	YEAR OF PUBLICATION
1.	Jon Duckett	Web Design with HTML, CSS, JavaScript and jQuery Set	Wiley Publications	2014.
2	Laura Lemay, Rafe Colburn, Jennifer Kyrnin	Mastering HTML, CSS, and Java Script Web Publishing	BPB Publications	2016.
3	Mary Delamater, ZukRuvalcaba	Java Script and jQuery	Mike Murach and Associates Inc.	2020.

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science)	
Course Code:	21UCS6E9			Title	Batch:	2021 - 2024
Lecture Hrs./Week	6	Tutorial Hrs./Sem.	90	Core Elective III: Angular and Node JS	Semester:	VI
					Credits:	5

Course Objective

Able to understand the theory and practical front end tools of web full stack developments: Angular and Node JS

Course Outcomes(CO)

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

CO Number	CO Statement	Knowledge Level
CO1	Understand Client Side MVC and SPA	K2
CO2	Explore AngularJS Component and develop an Angular JS	K3,K4
CO3	Develop an AngularJS Single Page Application from scratch	K3,K6
CO4	Demonstrate an Understanding of the use of and Node.js core modules	K1,K3
CO5	Apply MongoDB ,Middleware and make connectivity with front end tools	K3,K6

Mapping

PO CO	PO1	PO2	PO 3	PO4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	PSO1	PSO2
CO1	H	M	H	L	M	M	L	L	M	L	H	H
CO2	H	H	H	L	H	H	M	M	H	L	H	H
CO3	H	H	H	L	H	H	H	M	H	M	H	H
CO4	H	H	H	L	M	M	M	M	H	M	H	H
CO5	H	M	H	L	H	H	L	M	H	L	H	H

H-High; M-Medium; L-Low

Syllabus

Units	Content	Hrs
Unit I	AngularJS Core Concepts What is AngularJS?, Advantages of Angular, AngularJS MVC ,Introduction to SPA, Setting up the environment, First App using MVC architecture, Understanding ng attributes, Expression and Data Binding, Working with directives, Angular Modules, Controller, Scope and View ,Create Controller and Module, \$scope hierarchy	18

Unit II	Filter, Forms and Ajax Filters - Built-in filters - upper case and lower case filters, date ,currency and number formatting ,orderBy, filter ,custom filter, Angular JS Forms – Working with AngularJS forms, model binding, form controller ,Using CSS classes, form events ,custom model update triggers ,custom validation ,\$http service ,Ajax implementation using \$http	18
Unit III	Dependency Injection, Services ,Routing and Navigation What is dependency injection?, Using dependency injection, Angular JS service – Understanding services , Using built-in service, Creating custom service, Injecting dependency in service, Routing – What is Routing?, Routing using ngRoute and UIRouter, ngView Directive, Configuring \$routeProvider ,\$stateProvider, Animating Angular App	18
Unit IV	Introduction to Node.js What is Node.js?, Features of Node.js, Setup Development Environment- Installing Node.js, Working with REPL, Node.js Console, Node.js Module, Node Package Manager, Node.js Basics, File System ,HTTP and HTTPs, Creating Web Server- Handling http request, Node.js Callbacks, Node.js Events	18
Unit V	Database Connectivity Promises, Express.js, Database Connectivity – Connecting to RDBMS and NoSQL database, Performing CRUD operations	18
Total Contact Hrs		90

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation
Seminar, Online Quiz, DIGITAL Assignments, Group task:APS

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Brad Dayley	Node.js, MongoDB and AngularJS Web Development	Addison-Wesley 2 nd Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Adam Freeman	Pro Angular JS	Apress 1 ST Edition	2014
2	Agus Kurniawan	AngularJS Programming by Example	PE Press 1 ST Edition	2014
3	Amos Q. Haviv	MEAN Web Development	Packt Publishing Limited 1 ST Edition	2014