654	B.Com (BPS)	Banking Process for Business	22UBP411	2022
655	B.Com (BPS)	Market Research	22UBP412	2022
656	B.Com (BPS)	Campus to Corporate	22UBP515	2022
657	B.Com (BPS)	Business Process Management	22UBP516	2022
658	B.Com (BPS)	Supply Chain Management	22UBP620	2022
659	B.Sc Computer Science with Data Analytics	Programming in C	22UDA101	2022
660	B.Sc Computer Science with Data Analytics	Data Structures and Algorithms	22UDA102	2022
661	B.Sc Computer Science with Data Analytics	Mathematical Foundation for Data Science	22UDA1A1	2022
662	B.Sc Computer Science with Data Analytics	Programming Lab in C	22UDA103	2022
663	B.Sc Computer Science with Data Analytics	Object Oriented Programming with Java	22UDA204	2022
664	BSc CS with AI & ML	Core I: Java Programming	22UAI101	2022
665	BSc CS with AI & ML	Core II: Industry 4.0	22UAI102	2022
666	BSc CS with AI & ML	General Elective-1: Introduction to Linear Algebra	22UAI1A1	2022
667	BSc CS with AI & ML	Core Lab I: Programming Lab in Java	22UAI103	2022
668	BSc CS with AI & ML	Core I: Java Programming	22UAI101	2022
669	BSc CS with AI & ML	Core II: Industry 4.0	22UAI102	2022
670	BSc CS with AI & ML	General Elective-1: Introduction to Linear Algebra	22UAI1A1	2022
671	BSc CS with AI & ML	Core Lab II: Programming Lab in Python	22UAI206	2022
672	BSc CS with AI & ML	Capstone Project - 1	22UAI207	2022
673	BSW	Introduction to Social Work	22USW101	2022
674	BSW	Man and Society	22USW102	2022
675	BSW	Indian Social Problems	22USW1A1	2022

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NALLAMUTHU GOUNDER MAHALINGAM COLLEGE POLLACHI

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

POLLACHI

DEPARTMENT OF COMPUTER SCIENCE

MINUTES OF BOS MEETING

The 22nd Meeting of the Board of studies of the COMPUTER SCIENCE was held on 04.06.2022 at 10.00 AM in the COMMON RESEARCH CENTER, DEPARTMENT OF COMPUTER SCIENCE, NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI

S.No	NAME	DESIGNIATION	SIGNATURE
1	Dr. Antony Selvadoss Thanamani, Associate Professor and Head, Department of Computer Science, Nallamuthu Goundar Mahalingam College, Pollachi-642001	Chairman	ABSENT
2	Dr.R.A.Roseline, Associate Professor and Head, Department of Computer Science, Govt.Arts College , Coimbatore	University Nominee	ATTENDED THROUGH ONLINE MODE
3	Dr. K.Karthikeyan, Assistant Professor and Head, Department of Computer Science, Puratchi Thalaivi Amma Govt.Arts & Science College, Palladam	Academic Expert	4/6/22
4	Dr. A.Anbarasi, Assistant Professor, Department of Computer Science, LRG Govt.Arts College for Women, Tirupur	Academic Auditor	4/6/2022
5	Mr. V.Bharathan, Wipro Limited, Bangalore - 560037	Industrial Expert	V.Bharathan.
6	Mr. N.Dhanabal, Tata Consultancy Service Limited, Kochi - 682042	Alumni Representative	N.Dhanabal

7	Dr.R.Manicka Chezian, Associate Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
8	Mr.K.Srinivasan, Associate Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
9	Dr.Aruchamy Rajini, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi- 642001	Internal Member	
10	Dr.M. Sakthi, Associate Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
11	Dr.E.Ramadevi, Associate Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College,, Pollachi-642001	Internal Member	
12	Dr.R.Rathamani, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi- 642001	Internal Member	
13	Ms.M.Malathi, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
14	Dr.R.Nandhakumar, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	

15	Ms.M.Dhavapriya, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
16	Ms S.Sharmila, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
17	Ms N.Yasodha, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
18	Ms M.Meena Kiruthika, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
19	Ms S.S. Shanthi, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
20	Mr N.Arul Kumar, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
21	Mr N. Karthikeyan, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
22	Dr A.Kanagaraj, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	

23	Ms P.Jaya Priya, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
24	Ms G.Angayarkanni, Assistant Professor, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001	Internal Member	
25	Ms B.KouslayaDevi, Meritorious Student in Computer Science, Department of Computer Science, Nallamuthu Gounder Mahalingam College, Pollachi-642001.	Student Representative	

4.6.2022

HoD

04/06/22

CDC Co-ordinator

COE

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N.G.M. COLLEGE, POLLACHI

Dr. R.MANICKA CHEZIAN, M.Sc.,M.S.,Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

POLLACHI

22nd Board of Studies Meeting in the Department of Computer Science

Date & Time:04.06.2022 at 10.30 AM

Agenda

BoS / CS22.1	:	Welcome address and Opening Remarks by Chairman, Board of studies in the DEPARTMENT OF COMPUTER SCIENCE
BoS / CS22.2	:	Confirmation ofthe Minutes ofthe 22nd Previousmeeting ofBoard of studies in the DEPARTMENT OF COMPUTER SCIENCE held on 04.06.2022 and Action taken report of 11th meeting of Board of studies
BoS / CS22.3	:	22.3.1 Syllabus of BSc COMPUTER SCIENCE under Regulation 2022
		Any other Discussions if any
BoS / CS22.4	:	Suggestion given by BOS Members
BoS / CS22.5	:	Any other items

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE

POLLACHI

DEPARTMENT OF COMPUTER SCIENCE

MINUTES OF BOS MEETING

The 22rd Meeting ofthe Board ofstudies of the Department of Computer Science was held on 04.06.2022 at 10.30 a.m. in the Common Research Center, Nallamuthu Gounder Mahalingam College, Pollachi.

1. The following members were present:

1	Dr. R. Manicka chezian Associate Professor	Internal Members
2	Mr. K. Srinivasan Associate Professor	
3	Dr. Aruchamy Rajini Assistant Professor	
4	Dr. M. Sakthi Associate Professor	
5	Dr. E. Ramadevi Associate Professor	
6	Dr. R. Rathamani Assistant Professor	
7	Ms. M. Malathi Assistant Professor	
8	Dr. R. Nandhakumar Assistant Professor	
9	Ms. M. Dhavapriya Assistant Professor	
10	Ms. S. Sharmila Assistant Professor	
11	Ms. N. Yasodha Assistant Professor	
12	Ms. M. Meena Kiruthika Assistant Professor	
13	Mr. N. Arul Kumar Assistant Professor	
14	Mr. N. Karthikeyan Assistant Professor	
15	Dr. A. Kanagaraj Assistant Professor	
16	Ms. P. Jaya Priya Assistant Professor	
17	Ms. G. Angayarkanni Assistant Professor	

BoS/CS12.1 WELCOME ADDRESS AND OPENING REMARKS

Dr.R.Manicka chezian, The Internal Member of BoS, Department of Computer Science welcomed and introduced the members of 22nd Board of Studies and thanked each one of them for sparing their valuable time to attend the meeting.

BoS/CS 12.2 TO CONFIRM THE MINUTES OF 21st BOS MEETING HELD ON 22.05.2021.

The minutes of the 21st Board of Studies meeting held on 22.05.2021 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the 21st Academic council.

Action Taken Report (Enclosed in Annexure 1)

BoS/CS 12.3.1

BSc COMPUTER SCIENCE (I to VI SEMESTER)

The Following Papers from B. Sc Computer Science were accepted by the experts without no modification:

Course Code	Course Name
22UCS102	Core II: Digital Computer fundamentals and organization
22UCS1A2	Allied -1: Advance Mathematics and Applied Statistics Level-II
22UCS205	Core IV: Data and File Structure
22UCS2A1/ 22UCS2A2	Allied -2:Discrete Mathematics Level-I Allied-2:Discrete Mathematical Structure Level-II
22UCS308	Core VI: Relational Database Management System
22UCS309	Core VII: System Software and Operating System
22UCS3A3	Allied -3 : Computer Based Optimization Techniques
22UCS311	Core Lab IV: Programming Lab in RDBMS
22UCS3N1 / 22UCS3N2	Non-Major Elective Paper-I Photoshop Lab/ Advanced Applications in MS Excel Lab
22UCS412	Core VIII: Python Programming
22UCS413	Core IX: Open Source Technologies

22UCS414	Core X: Data Communication and Computer Networks
22UCS415	Core Lab V: Programming Lab using Python
22UCS416	Core Lab VI:Web Programming using Open Source Technologies
22UCS4N1 / 22UCS4N2	Non-Major Elective Paper-II Flash Lab/ Internet Services and Applications Lab
22UCS517	Core XI: Linux and Shell Programming
22UCS519	Core XIII: Cyber Security
22UCS5E1	Data mining and Warehousing
22UCS5E2	Data Engineering with Google Cloud
22UCS5E3	Mobile Application Development
22UCS520	Core Lab VII: Linux: shell and Socket Programming Lab
22UCS5S1	Word Press
22UCS5S2	Dream Weaver
22UCS5S3	Quantitative Aptitude Skills
22UCS622	Core XIV: R Programming(SEP)
22UCS6E4	Artificial Intelligence and Machine Learning
22UCS6E5	Front End Development with React
22UCS6E6	MongoDB
22UCS6E7	Information Retrieval
22UCS6E8	HTML,Javascript and JQuery for Web Designing
22UCS6E9	Angular NodeJS
22UCS624	Core Lab IX: R Programming Lab
22UCS625	Core Lab X: Advanced Applications in MS Excel Lab
22UCS6A L	Advanced Learner Course - II (Optional) - Self Study
22UCS6S4	Joomla
22UCS6S5	Macromedia Director
22UCS6S6	Advanced Soft Skills

The presented syllabus was accepted by the experts and a **few suggestions** were given as follows:

Course Code	Course Name	Reason for adding New Courses
22UCS101	Computing Fundamentals and C Programming	Based on the Students Feedback.
22UCS204	C++ Programming	Based on the Students Feedback.
22UCS307	Java Programming	Based on the Students Feedback.

New Courses Added in

Course Code	Course Name	Reason for adding New Courses
22UCS1A1	Allied1-Mathematics(Statistical Methods and Linear Algebra)	Feedback from Faculty
22UCS518	Android Programming	Feedback from Faculty
22UCS521	Programming Lab in Android	Feedback from Faculty
22UCS3VA	Google Workspace	Suggested by CDC
22UCS623	Internet of Things	Feedback from Faculty

To fulfill the needs Advanced Learners new courses were introduced and as follows

Course Code	Course Name
22UCS5AL	Robotic Process and Automation
22UCS6AL	Advanced Data Analysis using R

These changes have been made effect for the students admitted in 2022 with Semesters I to VI accordingly.

The board of studies has approved the Syllabi pattern of the first two Semesters for the two newcourses

1. B.Sc Computer Science with Artificial Intelligence & Machine Learning
2. B.Sc Computer Science with Data Analytics

for the forth-coming Academic year (2022).

The Scheme of Syllabus for B.Sc Computer Science with Artificial Intelligence &Machine Learning andB.Sc Computer Science with Data Analytics for the first two semesters has been attached

BoS/CS12.4 SUGGESTIONS GIVEN BY THE BoS MEMBERS

The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were incorporated appropriately in the Curriculum and Syllabi.

a) It is Suggested to replace Mathematics I Syllabus due to Highly Enrichment of the Syllabus also to complete Syllabus in Stipulated Hours
b) If any Student completed Online Courses in MOOC,NPTEL, E-Patahshala, TCS ION etc, the Course Credit can be included in existing Credit and Students can opt out equivalent credit course in the existing elective course.
c) In IV semester Mini Project should be Included, and that project is based on Open SourceTechnology

Based on the suggestions given by the members, BOS resolved to recommend the following to the Academic Council for further approval.

Department of Computer Science with Data Analytics

BSc COMPUTER SCIENCE WITH DATA ANALYTICS (I and II SEMESTER)

The following papers from B. Sc Computer Science with Data Analytics were accepted by the experts

Course Code	Course Name
22UDA101	Core I: Programming in C
22UDA102	Core II: Data Structures and Algorithms
22UDA1A1	Allied-1: Mathematical Foundation for Data Science
22UDA103	Core Lab I: Programming Lab in C
22UDA204	Core III: Object Oriented Programming with Java
22UDA205	Core IV: Operating System
22UDA2A1	Allied- 2: Statistics and Probability
22UDA206	Core Lab II: Programming Lab in Java
22UDA207	Capstone Project - 1

HOD

Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001.

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Department of Computer Science with Data Analytics

List of Courses having focus on Local, National, Regional, Global Developmental needs offered by the B.Sc Computer Science with Data Analytics

B.Sc Computer Science with Data Analytics						
Programme : B.Sc Computer Science with Data Analytics						**Year : 2022**
Course Code	**Course Title**	**Need**				**Rationale**
		Local	**National**	**Regional**	**Global**	
22UDA101	Core I: Programming in C	✓	✓	✓	✓	Efficiently work on enterprise applications, games, graphics, and applications requiring calculations
22UDA102	Core II: Data Structures and Algorithms	✓	✓	✓	✓	Knowledge for organizing, processing, retrieving and storing data and files
22UDA1A1	Allied-1: Mathematical Foundation for Data Science	✓	✓	✓	✓	Mathematics Foundation to analyze the data
22UDA103	Core Lab I: Programming Lab in C	✓	✓	✓	✓	Enhance the analyzing and problem solving skills and use the same for writing programs in C
22UDA204	Core III: Object Oriented Programming with Java	✓	✓	✓	✓	Used to develop desktop and mobile applications, big data processing,

						embedded systems, and so on
22UDA205	Core IV: Operating System	✓	✓	✓	✓	Manages computer hardware, software resources, and provides common services for computer programs
22UDA2A1	Allied-2: Statistics and Probability	✓	✓	✓	✓	Useful to analyze the big data
22UDA206	Core Lab III: Programming Lab in Java	✓	✓	✓	✓	General-purpose programming language that follows the object-oriented programming paradigm and the Write Once Run Anywhere approach
22UDA207	CAPSTONE PROJECT	✓	✓	✓	✓	Implementation of the concepts to bridge the gap between industry and academic

HOD

Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001.

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List of Courses having focus on employability/ entrepreneurship/ skill development offered by the Department of Computer Science with Data Analytics

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS						
Programme: B.Sc., Computer Science with Data Analytics					Year:2022	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
22UDA101	Core I: Programming in C	EM		SD		2022
22UDA102	Core II: Data Structures and Algorithms	EM		SD		2022
22UDA1A1	Allied-1: Mathematical Foundation for Data Science	EM		SD		2022
22UDA103	Core Lab I: Programming Lab in C	EM		SD		2022
22UDA204	Core III: Object Oriented Programming with Java	EM		SD		2022
22UDA205	Core IV: Operating System	EM		SD		2022
22UDA2A1	Allied- 2: Statistics and Probability	EM		SD		2022
22UDA206	Core Lab II: Programming Lab in Java	EM		SD		2022
22UDA207	Capstone Project - 1	EM		SD		2022

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Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001.

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DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS							
S. No	Course Code	Course Title	Change Details	% of Changes	Content Deleted	Content Updated	Reason for Change
1	22UDA101	Core I: Programming in C	NEW Syllabus	100			
2	22UDA102	Core II: Data Structures and Algorithms	NEW Syllabus	100			
3	22UDA1A1	Allied-1: Mathematical Foundation for Data Science	NEW Syllabus	100			
4	22UDA103	Core Lab I: Programming Lab in C	NEW Syllabus	100			
5	22UDA204	Core III: Object Oriented Programming with Java	NEW Syllabus	100			

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Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001.

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N.G.M College - Curriculum Development Cell
Scheme of Examination For 2022 - 2023
Choice Based Credit System & OBES

Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
I SEMESTER									
I	22UTL101/ 22UHN101/ 22UFR101	Tamil Paper-I/ Hindi Paper-I/ French Paper-I	6		3	50	50	100	3
II	22UEN101	English Paper-I	5		3	50	50	100	3
III	22UDA101	Core I: Programming in C	4		3	50	50	100	4
	22UDA102	Core II: Data Structures and Algorithms	4		3	50	50	100	4
	22UDA1A1	Allied-1: Mathematical Foundation for Data Science	4		3	50	50	100	4
	22UDA103	Core Lab I: Programming Lab in C		5	3	25	25	50	2
IV	22HEC101	Human Excellence: Personal Values& SKY Yoga Practice - 1		1	2	25	25	50	1
	22UHR101	Human Rights in India	1		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
Total								**650**	**23**

(Dr. E. Rama Devi)

Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001.

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

II SEMESTER									
Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX. MARKS			Credits
			T	P		CIA	ESE	Total	
I	22UTL202/ 22UHN202 22UFR202	Tamil Paper-II/ Hindi Paper-II/ French Paper-II	6		3	50	50	100	3
II	22UEN202	English Paper – II	5		3	50	50	100	3
III	22UDA204	Core III: Object Oriented Programming with Java	3		3	50	50	100	4
	22UDA205	Core IV: Operating System	4		3	50	50	100	4
	22UDA2A1	Allied 2 : Statistics and Probability	4		3	50	50	100	4
	22UDA206	Core Lab II: Programming Lab in Java		5	3	25	25	50	2
	22UDA207	Capstone Project - 1				25	25	50	2
IV	22HEC202	Human Excellence: Family Values& SKY Yoga Practice-2		1	2	25	25	50	1
	22EVS201	Environmental Studies	2		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
EC		Online Course (MOOC/NPTEL/SWAYAM) Optional							
	22CMM201	Manaiyiyal Mahathuvam - I	Certificate course						
	22CUB201	Uzhavu Bharatham - I	Certificate course						
Value Added Course	22VAD201	Department Specific Value-Added Course							
Total								**700**	**25**

Dr. E. RAMA DEVI, MCA.,M.Phil.,Ph.D.,
Associate Professor & Head
Department of Computer Science
with Data Analytics
NGM College, Pollachi - 642 001

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

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Nallamuthu Gounder Mahalingam College
(Autonomous)
(An ISO 9001:2015 Certified Institution)
Re-Accredited with 'B' Grade by NAAC
Pollachi-642001

SYLLABUS

B.Sc. COMPUTER SCIENCE WITH DATA ANALYTICS

BATCH 2022-2025

CDC / 22 R 1.1

NGM COLLEGE

Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

DEPARTMENT OF COMPUTER SCIENCE WITH DATA ANALYTICS

Vision

To prepare the next generation of practitioners and researchers for a data centric world and to achieve the academic excellence and research in the field of Data Science at the national and global levels.

Mission

- To develop professionals who are skilled in the area of Data science and analytics
- To impart quality and value-based education and contribute towards the innovation of Computing expert systems.
- To apply new advancements in high performance computing hardware and software

Program Educational Objectives (PEOs)	
The B.Sc. Computer Science with Data Analytics program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics
PEO2	Apply principles of Data Science to the analysis of business problem
PEO3	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
PEO4	To enhance communicative skill and inculcate the spirit through professional activities and to solve the complex problems in data analysis
PEO5	To embed human values and professional ethics in the young minds and contribute towards nation building

Programme Outcomes (POs)	
On successful completion of the B.Sc. Computer Science with Data Analytics	
PO1	**Disciplinary knowledge:** Capable to apply the knowledge of mathematics, algorithmic principles and computing fundamentals in the modeling and design of computer based systems of varying complexity.
PO2	**Scientific reasoning/ Problem analysis:** Ability to critically analyze, categorizes, formulate and solve the problems that emerges in the field of computer science with Data Analytics
PO3	**Problem solving:** Able to provide software solutions for complex Data Analysis problems or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations
PO4	**Environment and sustainability:** Understand the impact of software solutions in environmental and societal context and strive for sustainable development
PO5	**Modern tool usage:** Use contemporary techniques, skills and tools necessary for integrated solutions
PO6	**Ethics:** Function effectively with social, cultural and ethical responsibility as an individual or as a team member with positive attitude**.**
PO7	**Cooperation / Team Work:** Function effectively as member or leader on multidisciplinary teams to accomplish a common objective.
PO8	**Communication Skills**: An ability to communicate effectively with diverse types of audience and also able to prepare and present technical documents to different groups.
PO9	**Self-directed and Life-long Learning:** Graduates will recognize the need for self-motivation to engage in lifelong learning to be in par with changing technology
PO10	**Research:** Enhance the research culture and uphold the scientific integrity and objectivity.

Program Specific Outcomes (PSOs)	
After the successful completion of **B.Sc. Computer Science with Data Analytics** program, the students are expected to	
PSO1	Impart education with domain knowledge and key technologies in data science and business analytics like data mining, machine learning, No SQL, visualization techniques, predictive modeling, and statistics effectively and efficiently in par with the expected quality standards for Data analyst professional.
PSO2	Ability to apply the mathematical, technical and critical thinking skills in the discipline of Data analytics to find solutions for complex problems.

PEOs / POs \ PSOs	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	H	H	H	L	L
PO2	H	H	H	L	L
PO3	H	H	H	H	L
PO4	L	M	M	M	L
PO5	M	M	M	H	M
PO6	L	L	M	H	L
PO7	M	M	M	H	M
PO8	L	L	L	H	M
PO9	M	M	M	H	L
PO10	M	M	M	M	L
PSO1	H	H	H	M	L
PSO2	H	H	H	H	M

N.G.M College - Curriculum Development Cell
Scheme of Examination For 2022 - 2023
Choice Based Credit System & OBES

Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
I SEMESTER									
I	22UTL101/ 22UHN101/ 22UFR101	Tamil Paper-I/ Hindi Paper-I/ French Paper-I	6		3	50	50	100	3
II	22UEN101	English Paper-I	5		3	50	50	100	3
III	22UDA101	Core I: Programming in C	4		3	50	50	100	4

	22UDA102	Core II: Data Structures and Algorithms	4		3	50	50	100	4
	22UDA1A1	Allied-1: Mathematical Foundation for Data Science	4		3	50	50	100	4
	22UDA103	Core Lab I: Programming Lab in C		5	3	25	25	50	2
IV	22HEC101	Human Excellence: Personal Values& SKY Yoga Practice - 1		1	2	25	25	50	1
	22UHR101	Human Rights in India	1		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
Total								**650**	**23**

II SEMESTER

Part	**Course Code**	**Title of the Paper**	**Hours/ Week**		**Exam Hours**	**MAX. MARKS**			**Credits**
			T	P		**CIA**	**ESE**	**Total**	
I	22UTL202/ 22UHN202 22UFR202	Tamil Paper-II/ Hindi Paper-II/ French Paper-II	6		3	50	50	100	3
II	22UEN202	English Paper – II	5		3	50	50	100	3
III	22UDA204	Core III: Object Oriented Programming with Java	3		3	50	50	100	4
	22UDA205	Core IV: Operating System	4		3	50	50	100	4

	22UDA2A1	Allied 2 : Statistics and Probability	4		3	50	50	100	4
	22UDA206	Core Lab II: Programming Lab in Java		5	3	25	25	50	2
	22UDA207	Capstone Project - 1				25	25	50	2
IV	22HEC202	Human Excellence: Family Values& SKY Yoga Practice-2		1	2	25	25	50	1
	22EVS201	Environmental Studies	2		2		50	50	2
V		Extension Activities (NSS, NCC, Sports & Games)							
EC		Online Course (MOOC/NPTEL/SWAYAM) Optional							
	22CMM201	Manaiyiyal Mahathuvam - I	Certificate course						
	22CUB201	Uzhavu Bharatham - I	Certificate course						
Value Added Course	22VAD201	Department Specific Value-Added Course							
Total								**700**	**25**

Question Paper Pattern
(Based on Bloom's Taxonomy)

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory Examinations: 50 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define/Short Answer)	10 x 1 = 10	MCQ/Define	**50**
K3 (Q 11-15)	B (Either or pattern)	5 x 3 = 15	Short Answers	
K4 & K5 (Q 16 – 20)	C (Either or pattern)	5 x 5 = 25	Descriptive/ Detailed	

2. Theory Examinations: 50 Marks (Part IV : NME)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q 1 -10)	A (Q 1 – 5 MCQ) (Q 6–10 Define/Short Answer)	10 x 1 = 10	MCQ Define	**50**
K3, K4 & K5 (Q 11-15)	B (Either or pattern)	5 x 8 = 40	Short Answers	

3. Practical Examinations: 100/50 Marks

Knowledge Level	Criterion	External/Internal Marks	Total
K3	Record work & Practical	50/50	100
K4			
K5		25/25	50

Components of Continuous Assessment

THEORY

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Test 1	(50 / 3.33) = 15	15+15+10+05+05	50
Test 2 / Model	(50 / 3.33) = 15		
Assignment / Digital Assignment	10		
Seminar / Socratic Seminar	05		
Group Task : GD, Role Play, APS	05		

Maximum Marks: 50; CIA Mark: 25

Components		Calculation	CIA Total
Test / Model	10	10+5+5+5	25
Assignment / Digital Assignment	5		
Seminar / Socratic Seminar	5		
Group Task : GD, Role Play, APS	5		

PRACTICAL

Maximum Marks: 50; CIA Mark: 25

Components		Calculation	CIA Total
Test / Model	15	15+5+5	25
Observation Note	5		
Record	5		

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Test / Model	30	30+5+15	50
Observation Note	5		
Record	15		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Test / Model	60	60+10+30	100
Observation Note	10		
Record	30		

PROJECT

Maximum Marks: 100; CIA Mark: 50

Components		Calculation	CIA Total
Review I	10	10+10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

Maximum Marks: 200; CIA Mark: 100

Components		Calculation	CIA Total
Review I	20	20+20+20+40	100
Review II	20		
Review III	20		
Report Submission	40		

** Components for 'Review' may include the following:*

Originality of Idea, Relevance to Current Trend, Candidate Involvement and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
5	4	2 - 3	0 - 1

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as interesting story in logical, easy to follow sequence	Information presented in logical sequence; easy to follow	Most of information presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of subject & References	Demonstrated full knowledge; answered all questions with elaboration **&** Material sufficient for clear understanding **AND** exceptionally presented	At ease; answered all questions **but** failed to elaborate **&** Material sufficient for clear understanding **AND** effectively presented	At ease with information; answered most questions **&** Material sufficient for clear understanding **but** not clearly presented	Does not have grasp of information; answered only rudimentary Questions **&** Material not clearly related to topic **OR** background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with audience	Refers to slides to make points; eye contact majority of time	Refers to slides to make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms. Voice is clear and steady; audience can hear well at all times	Incorrectly pronounces few terms. Voice is clear with few fluctuations; audience can hear well most of the time	Incorrectly pronounces some terms. Voice fluctuates from low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms. Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale:

A	B	C	D	F
09 - 10	07- 08	05 - 06	03 - 04	01 - 02

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and writing is interesting	Hits in basic content and writing is understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	* Word choice is rich and varies * Writing style is consistently strong * Students own formal language	* Word choice is clear and reasonably precise * Writing language is appropriate to topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to topic * Informal language	* Word choice is vague * Writing language is not appropriate to topic * Message is unclear	* Not adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timelines	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

Continuous Internal Assessment for Project / Internship

For Commerce, Management & Social Work Programme

The Final year Commerce, Management & Social Work students should undergo a project work during (V/VI) semester

- The period of study is for 4 weeks.
- Project / Internship work has to be done in an industrial organization (or) work on any industrial problem outside the organization is allowed.
- Students are divided into groups and each group is guided by a Mentor.
- The group should not exceed four students, also interested student can undergo individually.
- A problem is chosen, objectives are framed, and data is collected, analyzed and documented in the form of a report / Project.
- Viva – Voce is conducted at the end of this semester, by an External Examiner and concerned Mentor (Internal Examiner).
- Project work constitutes 100 marks, out of which 50 is Internal and 50 is External Marks.

Mark Split UP

Internal	External	Total
50	50	100

S. No	Internal Components	Marks
1	Review - I	10
2	Review - II	10
3	Review - III	10
4	Rough Draft Submission	20
Total		**50**

S. No	External Components	Marks
1	Originality of Idea	05
2	Relevance to Current Trend	05
3	Candidate Involvement	05
4	Thesis Style / Language	05
5	Presentation of Report	10
6	Viva-Voce	20
Total		**50**

Continuous Internal Assessment for Project

For Computer Science Cluster

Maximum Marks: 50 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	10	50
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	10	
III	Coding, Input forms, Output format, Testing OR Development, Testing	20	
IV	Preparation of Report & Submission	10	

External Assessment: 50 Marks

Mode of Evaluation	Marks	Total	Grand Total
Project Report			50
Title Relevance of the Industry/Institute	05	30	
Technology	05		
Design and development Publishing	10		
Testing, Report	10		
Viva Voce			
Project Presentation	10	20	
Q&A Performance	10		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters
8. Appendix
9. References

Format of Table of Contents

TABLE OF CONTENTS

Size of the Project

The Project Report contents should be maximum of not exceeding 70 pages.

SEMESTER I

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA101			**Title**	**Batch:**	2022 - 2025
				Core I: Programming in C	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C programming

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Remembering the history, importance and basic structure of C Programming	K1
CO2	Interpret the concepts of Variables, Constant, Operators and various types of expressions	K2
CO3	Apply the concept of Decision-making statements and looping constructs for solving basic programs	K3
CO4	Use the concepts of files and pointers inside a C program	K4
CO5	Develop programs incorporating all the C language constructs	K5

Mapping

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

Units	Content	Hrs
Unit I	History of C – Importance of C – Basic structure of C Program – Programming Style – Executing a C Program - **Overview of C** - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants	12
Unit II	Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators- Arithmetic Expressions- Evaluation of expression- precedence of arithmetic operators- Type conversion in expression– operator precedence & associativity– Mathematical functions - Reading & Writing a character - Formatted input and output	11
Unit III	Decision Making and Branching: Introduction – if, if….else, nesting of if…else statements - else if ladder –The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping: Introduction-The while statement- the do statement–the for statement- jumps in loops. Arrays–Character Arrays and Strings	12
Unit IV	User-Defined Functions: Introduction–Need and Elements of User-Defined Functions-Definition- Return Values and their types –Function Calls–Declarations– Category of Functions- Nesting of Functions- Recursion – Passing Arrays and Strings to Functions -The Scope, Visibility and Life time of Variables- Multi file Programs- Structures and Unions.	12
Unit V	Pointers: Introduction- Understanding pointers-Accessing the address of a variable-Declaration and Initialization of pointer Variable – Accessing a variable through its pointer-Chain of pointers- Pointer Expressions – Pointer Increments and Scale factor-Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments- Functions returning pointers – Pointers to Functions – Pointers and Structures. File Management in C.	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming in ANSI C	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok N Kamthane	Programming with ANSI and Turbo C	Pearson	2002.
2	Henry Mullish & Hubert L. Cooper	The Spirit of C	Jaico,	1996

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Dr. E. Rama Devi Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Dr. R . ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)
Course Code:	22UDA102			**Title**	**Batch:** 2022 - 2025
				Core II: Data Structures and Algorithms	**Semester:** I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:** 4

Course Objective

- To introduce the concept of data structures and the types of data structures
- To demonstrate how various data structures can be implemented and used in various applications

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Define the concept of Data structure and list the various classifications of data Structures.	K1
CO2	Demonstrate how arrays, stacks, queues, l inked lists, trees, heaps, Graphs and Hash Tables are represented in the main memory and various operations are performed on those data structures.	K2
CO3	Illustrate the various file organizations like Sequential, Random and Linked Organizations.	K3
CO4	Discover the real time applications of the various data structures	K4
CO5	Design algorithms for various sorting and searching techniques	K5

Mapping

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

Units	Content	Hrs
Unit I	Introduction: Introduction of Algorithms, Analyzing Algorithms. Arrays: Sparse Matrices- Representation of Arrays. Stacks and Queues. Fundamentals- Evaluation of Expression Infix to Postfix Conversion - Multiple Stacks and Queues	12
Unit II	Linked List: Singly Linked List –Linked Stacks and Queues- Polynomial Addition- More on Linked Lists- Sparse Matrices- Doubly Linked List and Dynamic –Storage Management- Garbage Collection and Compaction.	11
Unit III	Trees: Basic Terminology – Binary Trees- Binary Tree Representations - Binary Trees- Traversal- More on Binary Trees- Threaded Binary Trees- Binary Tree Representation of Trees- Counting Binary Trees. Graphs: Terminology and Representations - Traversals, Connected Components and Spanning Trees, Shortest Paths and Transitive Closure	12
Unit IV	External Sorting : Storage Devices –Sorting with Disks: K-Way Merging- Sorting with Tapes Symbol Tables: Static Tree Tables – Dynamic Tree Tables –Hash Tables: Hashing Functions- Overflow Handling	12
Unit V	Internal Sorting: Insertion Sort – Quick Sort – 2 Way Merge Sort- Heap Sort- Shell Sort-Sorting on Several Keys. Files: Files, Queries and Sequential organizations – Index Techniques- File Organizations.	13
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ellis Horowitz, Sartaj Shani	Data Structures	Galgotia Publication.	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran	Computer Algorithms	Galgotia Publication	2007

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. K.Thilagam Signature	Dr. E. Rama Devi Signature	Mr. K. Srinivasan Signature	Dr. R . ManicaChezian Signature

Programme Code:	B.Sc,			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA1A1			**Title**	**Batch:**	2022 - 2025
				Allied I Mathematical Foundation for Data Science	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

- To introduce the mathematical foundation for Data Science
- To demonstrate how various mathematical concepts are used in Data Science

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To introduce the ideas in differential calculus	K1
CO2	To learn about definite integrals and its applications	K2
CO3	To learn the different methods of solving Simultaneous algebraic equation	K3
CO4	To learn about interpolation and its formula	K4
CO5	To introduce different methods of Numerical Differentiation and Numerical integration	K5

Mapping

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

Units	Content	Hrs
Unit I	**Deferential Calculus**: The Derivative as a Function- Maximum and Minimum Values- Optimization Problems	12
Unit II	**Integral Calculus**: The Definite Integral – The Fundamental theorem of Calculus- Areas between Curves- Volumes	12
Unit III	**Numerical Methods:** Solution of System of Simultaneous Algebraic Equations-Gauss Elimination Methods - Gauss Jordon Method - Gauss Jacobi Iterative Method - Gauss Seidal Iterative Method	12
Unit IV	**Numerical Methods**: Difference Table - Interpolation - Newton's Forward Interpolation Formula Newton's Backward Interpolation Formula-Construction of Polynomials-Equidistant terms with one or more missing values	12
Unit V	**Numerical Methods :** Numerical Differentiation : Newtons forward and Backward formula to compute the Derivatives **Numerical Integration:** TheTrapezoidalrule-Simpsons1/3and3/8rule	12
	Total Contact Hrs	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION

1	James Stewart	Calculus: Early Transcendentals, **Unit - I:** Chapter II (Section 2.8), Chapter IV (Sections 4.1,4.7) Problems Only **Unit-II:** Chapter V Sections:(5.2,5.3),Chapter VI Sections 6.1,6.2) (Problems only)	7th Edition, Cengage Learning, USA,	2012
2	Sr.M.K. Venkataraman	Numerical Methods in Science and Engineering. **Unit-III** Chapter IV (Sections: 4.1,4.2 & 4.6) (Problems only) **Unit-IV:** Chapter V (Sections: 5.1 to 5.10, 6.1 to 6.5) (Problems only) **Unit-V**: (Sections: 9.1 to 9.3, 9.8, 9.10) (Problems only)	The National Publishing Company	July 2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Hadrien Jean	Essential Math for Data Science	O'Reilly Media	July 13th 2021

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. E. Rama Devi Signature	Name:Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R . ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA103			**Title**	**Batch:**	2022 - 2025
				Core Lab I Programming Lab in C	**Semester:**	I
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objective

- To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Apply the various basic programming constructs like decision making statements. Looping statements, functions, structures, pointers and files	K3
CO2	Design programs using the concept of files in C and be able to simulate operations	K4
CO3	Determine the efficient techniques in programming to solve various scientific problems	K5

Mapping

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

Units	Content
	SET A 1. Write a C program to calculate the average of N numbers 2. Write a C program to check the greatest among three numbers. 3. Write a C program for finding sum of individual digits. 4. Write a C program to check whether the given number is Armstrong number or not. 5. Write a C program to generate the prime numbers between a given range. 6. Write a C program to generate the Fibonacci series for the given number. 7. Write a C program to print the Floyd's triangle. 8. Write a C program to find the mean, median & mode for given values. 9. Write a C program to calculate the factorial value for the given number using recursion. 10. Write a C program to count the number of words, characters and lines in a given text. 11. Write a C program to find the reverse of a given number. 12. Write a C program to find if the given string is a palindrome or not. 13. Write a C program to count the number of vowels in a given string. 14. Write a C program to convert upper case to lower case and lower case to upper case. 15. Write a C program to insert or delete an element in an array. **SET B** 16. Write a C program to sort the numbers in ascending /descending order using arrays. 17. Write a C program to find the addition of matrix. 18. Write a C program to find the matrix multiplication 19. Write a C program to display transpose matrix of a given number. 20. Write a C program to sort the strings in alphabetical order. 21. Write a C program to perform linear search in a given array. 22. Write a C program to create a student file with reg no, name, mark1, mark2.. 23. Write a C program to merge two files. (Using Files) 24. Write a C program to read and write to the file Using fread() and fwrite() functions. **25.** Write a program to implement command line arguments
	Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming in ANSI C	Tata McGraw-Hill, Eighth Edition	

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ashok N Kamthane	Programming with ANSI and Turbo C	Pearson	2002.
2	Henry Mullish & Hubert L. Cooper	The Spirit of C	Jaico,	1996

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. E. Rama Devi Signature	Name: Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R . ManicaChezian Signature

SEMESTER II

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA204			**Title**	**Batch:**	2022 - 2025
				Core III: Object Oriented Programming with Java	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

- To introduce the concepts of Object Oriented Programming Paradigm and the programming constructs of JAVA

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Recite the history of JAVA and its evolution	K1
CO2	Explain the various programming language constructs, object oriented concepts like overloading, inheritance, polymorphism, Interfaces , threads, exception handling and packages.	K2
CO3	Illustrate the concepts of Applets, files and the concept of stream classes.	K3
CO4	Outline the benefits and applications of objects oriented programming concepts and defend how JAVA differs from other programming languages	K4
CO5	Judge the pros and cons of other object oriented language with the concepts of JAVA	K5

Mapping

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

Units	Content	Hrs
Unit I	**Fundamentals of Object-Oriented Programming**: Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object- Oriented Programming. **Java Evolution:** History – Features – How Java differs from C and C++ – Java and Internet – Java and www –Web Browsers**. Overview of Java:** simple Java program- Java program Structure – Java Tokens – Statements –Java Virtual Machine – Command Line Arguments	12
Unit II	**Constants, Variables, Data Types - Operators and Expressions** – **Decision Making and Branching:** if, if...else, nested if, switch? : Operator **- Decision Making and Looping:** while, do, for – Jumps in Loops - Labeled Loops –**Classes, Objects and Methods.**	11
Unit III	**Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.**	12
Unit IV	**Managing Errors and Exceptions:** Introduction-Types of Errors-Exceptions-Syntax of Exception Handling-Multiple catch statements-Finally statement-throwing our own exception **Applet Programming:** Introduction-How Applets differ application- Preparing to Write Applets-Building applet code- Applet lifecycle-Creating an Executable Applet - Designing Web page-Applet tag-Adding Applet to HTML file - Running the Applet-Passing Parameters to Applets **Graphics Programming**: Introduction-Graphics Class – Lines and Rectangles-Circles and Ellipses – Drawing Arcs-Drawing Polygons-Line Graph-using control loop in Applets-Drawing Bar Chart	12
Unit V	Managing Input / Output Files in Java: Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading / Writing characters, Byte-Handling Primitive Data Types – Random Access Files.	13
	Total Hours	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming with Java – A Primer	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patrick Naughton and Hebert Schildt	The Complete Reference Java 2	Tata McGraw-Hill, 3rd Edition	
2	John R. Hubbard	Programming with Java	Tata McGraw-Hill, 2nd Edition	

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. E. Rama Devi Signature	Name: Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R . ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA205			**Title**	**Batch:**	2022 - 2025
				Core IV: Operating System	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

Course Objective

The 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 Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the basic concepts Operating System	K1
CO2	To understand the concepts of Storage Allocation, Process Management, and Scheduling Algorithms	K2
CO3	To apply the Process Management principles and functionalities in Database Systems	K3
CO4	Understanding the File concepts	K4
CO5	To review the case studies in Windows	K5

Mapping

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

Units	Content	Hrs
Unit I	Introduction: Definition of operating system – History of operating system. Hardware: Interrupts and polling – Buffering – Storage protection – online and offline operation – Cycle stealing – Problem state – Virtual storage – Multi processing – Storage Hierarchy – RISC. Software: Machine Language programming – Spooling – Optimizing Compiler – Object oriented programming – Emulation. Process Management: Definition – process states – The Process Control Block – Operations on process – Interrupt Processing – Nucleus of OS.	12
Unit II	Storage Mangement: Real Storage: Storage organization – Management – Hierarchy – Storage management Strategies – Contiguous Vs Non-contiguous storage allocation – Fixed partition multiple programming – Variable partition multiple programming - Multiprogramming with storage swapping – Virtual storage organization – Concepts – Paging – Segmentation – Paging /segmentation systems.	11
Unit III	Job and Processor Scheduling: Introduction –Scheduling levels – Scheduling objectives – Scheduling criteria – Preemptive Vs Non-preemptive scheduling – Priorities – FIFO – Round Robin –Quantum size – Shortest job – Shortest remaining time – Highest response ratio next. Deadlock: Definition – Examples –Deadlock prevention, avoidance, detection and recovery– Banker's Algorithm only	12
Unit IV	Auxillary Storage Management: Disk performance optimization: Why Disk scheduling is necessary –Desirable characteristics of disk scheduling polices – Seek optimization – Disk Caching – RAM Disks. File and Database Systems :Introduction – File system- File system function – Blocking and buffering – File Organization – Allocating and freeing space – File Descriptor – Access Control matrix – access control by user classes – Backup and recovery	12
Unit V	Case study Windows: Introduction - History– design goals - system architecture. Process & thread management: Process & thread organization scheduling-synchronization. Memory management: memory organization allocation-page replacement. File system management: file system drivers NTFS. Input output management: device drivers-I/O processing-interrupt handling-file cache management.	13
	Total Hours	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital, Deital and Choffnes	Operating Systems	Pearson education and Dorling kindersly publishing,Inc., Third edition.	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Andrew S. Tanenbaum, Albert S. Woodhull	Operating Systems Design and Implementation	Prentice Hall, Third Edition	2006

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Dr.K. Thilagam Signature	Name: Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R . ManicaChezian Signature

Course Objective

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA2A1			**Title**	**Batch:**	2022 - 2025
				ALLIED II: Statistics and Probability	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	4	**Tutorial Hrs./Sem.**	60		**Credits:**	4

To introduce the concepts of statistics and Probability in the field of Data Science

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	K1
CO2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.	K2
CO3	Apply the concept of testing of hypothesis for small and large samples in real life problems	K3
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.	K4
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and Management problems.	K5

Mapping

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

Units	Content	Hrs
Unit I	Probability – The axioms of probability – Conditional probability – Baye‘s theorem – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.	12
Unit II	Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).	11
Unit III	Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests based on Normal distribution for single mean and difference of means - Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit..	12
Unit IV	One way and Two way classifications – Completely randomized design – Randomized block design – Latin square design – 22 factorial design.	12
Unit V	Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) –Tolerance limits – Acceptance sampling.	13
	Total Hours	**60**

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Johnson, R.A., Miller, I and Freund J.,	Probability and Statistics for Engineers	Pearson Education, Asia, 8th Edition	2015
2	Milton. J. S. and Arnold. J.C	Introduction to Probability and Statistics	Tata McGraw Hill, 4th Edition	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Devore. J.L.	Probability and Statistics for Engineering and the Sciences‖,	Cengage Learning, New Delhi, 8th Edition	2014
2	Papoulis, A. and Unni krishnapillai, S.	Probability, Random Variables and Stochastic Processes	McGraw Hill Education India, 4th Edition, New Delhi.	2010
3	Ross, S.M.,	Introduction to Probability and Statistics for Engineers and Scientists	Elsevier, 3rd Edition.	2004
4	Spiegel. M.R., Schiller. J. and Srinivasan, R.A.,	Schaum‘s Outline of Theory and Problems of Probability and Statistics	Tata McGraw Hill Edition	2004
5	Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K.	Probability and Statistics for Engineers and Scientists	Pearson Education, Asia, 8th Edition	2007

Course Designed by	**Head of the Department**	**Curriculum Development Cell**	**Controller of the Examination**
Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr.K.Thilagam Signature	Name: Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R . ManicaChezian Signature

Programme Code:	B.Sc			**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA206			**Title**	**Batch:**	2022 - 2025
				Core Lab II Programming Lab in Java	**Semester:**	II
Lecture Hrs./Week or Practical Hrs./Week	5	**Tutorial Hrs./Sem.**	75		**Credits:**	2

Course Objective

- To introduce the concepts of Object Oriented Programming Paradigm and the programming constructs of JAVA

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Apply the various basic programming constructs of JAVA like decision making statements. Looping statements, overloading, inheritance, polymorphism, constructors and destructors	K3
CO2	Illustrate the concepts of threading and multi-threading	K4
CO3	Design programs using various file stream classes; file types, and frames	K5

Mapping

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

Units	Content
	SET A 1. Program to sort n numbers 2. Program to search an element in an array 3. Program to implement stack using interface 4. Program to implement queue using package 5. Program for processing Bank details using the concept of multiple inheritance using Interfaces 6. Program to implement the concept of multithreading 7. Program to check division by zero using exception handling 8. Write a program to implement various string operations 9. Program to draw Smiley using Applet 10. Program to get the parts of the URL using Networking concepts **SET B** 11. Program to determine whether two string are anagram or not. 12. Write a program to implement mouse events 13. Program to implement Key events 14. Program to perform arithmetic operations using AWT controls. 15. Program to demonstrate the Multiple Selection List-box. 16. Program to create a frame with four text field's name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its corresponding values are to be appeared in the text fields. 17. Program to create a frame with three text fields for name, age and qualification and a text field for multiple line for address. 18. Program to copy one file to another file. 19. Program for processing random access file. 20. Program to create Menu Bars and pull down menus.
	Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E Balagurusamy	Programming with Java – A Primer	Tata McGraw-Hill, Eighth Edition	2019

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Patrick Naughton and Hebert Schildt	The Complete Reference Java 2	Tata McGraw-Hill, 3rd Edition	
2	John R. Hubbard	Programming with Java	Tata McGraw-Hill, 2nd Edition	

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Name and Signature	**Name and Signature**	**Name and Signature**	**Name and Signature**
Name: Dr. E. Rama Devi Signature	Name: Dr. E. Rama Devi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R. ManicaChezian Signature

Programme Code:	B.Sc.	**Programme Title:**	Bachelor of Science (Computer Science with Data Analytics)	
Course Code:	22UDA207	**Title**	**Batch:**	2022- 2025
		Capstone Project - 1	**Semester:**	II

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of computer science lab as well as in the organization. Periodical review will be conducted to monitor the progress of the project work. Project report will be prepared and submitted at the end of the semester. External examiner appointed by the Controller of Examination will conduct the viva voce examination along with respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents

The sequence in which the project report material should be arranged and bound as follows:

10. Cover Page & Title Page

11. Bonafide Certificates
12. Declaration

13. Acknowledgement
14. Synopsis
15. Table of Contents
16. Chapters
17. Appendix
18. References

Format of Table of Contents

TABLE OF CONTENTS

7.2 Screenshots and Reports

8 References

Size of the Project

The Project Report contents should be maximum of not exceeding 70 pages.