

**NGM COLLEGE, POLLACHI DEPARTMENT OF COMPUTER SCIENCE WITH
ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

Semester I and III -- 2023-2024

Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development

SNo	Year	Title of the paper	
Semester I			
1	I	23UAI101 Programming in C	Employability
2	I	23UAI102 Data Structures and applications	Skill development
3	I	23UAI103 Programming in C- Lab I	Employability, Entrepreneurship
4	I	23UAI1A1 Introduction to Linear Algebra	Skill development
Semester III			
5	II	22UAI307 Database Concepts	Skill development Employability
6	II	22UAI308 Introduction to AI	Skill development, Employability
7	II	22UAI3A3 Discrete Structures and its Applications	Skill development
8	II	22UAI309 Lab III: Database Concepts Lab	Employability
9	II	22UAI310 Lab IV: AI Lab	Employability
10	II	22UAI3N1 Non Major Elective	Skill development

Semester II and IV -- 2023-2024

Activities/Content with a direct bearing on Employability/ Entrepreneurship/ Skill development

SNo	Year	Title of the paper	
Semester II			
1	I	23UAI204 Java Programming	Skill development
2	I	23UAI205 Operating System	Skill development
3	I	23UAI2A1 Probability and Statistics	Skill development
4	I	23UAI206 Java Lab	Skill development, Employability
5	I	23UAI2S1 Naan Mudhalvan: Industry 4.0	Skill development
Semester IV			
6	II	22UAI412 Cloud Computing	Skill development, Employability
7	II	22UAI413 Introduction to ML	Skill development, Employability
8	II	22UAI4A1 Mathematics for ML	Skill development
9	II	22UAI414 ML Lab	Employability
10	II	22UAI415 Capstone project	Employability, Entrepreneurship
11	II	22UAI51 Naan Mudhalvan: Block Chain	Skill development
12	II	22UAI4N2-NME:-II Web Technologies	Entrepreneurship
13	II	Value Added Course-II Python for Data science	Employability,


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DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

**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 ARTIFICIAL INTELLIGENCE &
MACHINE LEARNING**

BATCH 2023-2026

Department of Computer Science with Artificial Intelligence & Machine learning

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.

Program Educational Objectives:

PEO1	Expertise with the principles of Artificial Intelligence and problem solving, inference, perception, knowledge representation, and learning
PEO2	Exhibit high standards with regard to application of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning and deep learning models
PEO3	Investigate with a machine learning model for simulation and analysis and explore the scope, potential, limitations, and implications of intelligent systems.
PEO4	Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PEO5	Instill key technologies in Artificial Intelligence, Machine Learning and deep learning, visualization techniques, Natural language processing and Robotics.

Program Outcomes:

PO1	Domain Knowledge: Demonstrate a sound understanding of all the main areas of Machine Learning & AI and also demonstrate the ability to exercise critical judgement in the evaluation of Machine Learning and AI applications.
PO2	Problem Analysis: Understand how to distill a real-world challenge as an artificial intelligence problem, involving explicit representation and learning of symbolic and numeric models; reasoning about such models; and using such models for decision making, action selection, and interaction with humans.

PO3	Design/development of solutions: Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	Communicative & oratorical Skills: Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PO5	Exhibit Entrepreneurial Skills: Deliver innovative ideas to instigate new business ventures and possess the qualities of a good entrepreneur
PO6	Ethics: Recognize the social impact of artificial intelligence and the underlying responsibility to consider the ethical, privacy, moral, and legal implications of artificial intelligence technologies.
PO7	Individual and teamwork: Graduates will be able to undertake any responsibility as an individual/member of multidisciplinary teams and have an understanding of team leadership
PO8	Use of State-of-the-Art AI and machine learning tools & techniques: Design, analyze, implement, and use state-of-the-art AI and machine learning tools & techniques for dealing with real-world data, including data involving vision, language, perception, and uncertainty.
PO9	Dynamism and Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO10	Research instinct: Apply AI and ML specific research techniques, tools, methods, design of experiments, analysis and synthesis of the information for conducting investigations of complex problems.

Program Specific Outcomes:

PSO - 01	Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards for Artificial Intelligence and Machine Learning professional.
PSO - 02	Apply the technical and critical thinking skills in the discipline of artificial intelligence and machine learning to find solutions for complex problems.Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.

Mapping

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

**DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE &
MACHINE LEARNING**

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2023 - 2024 ONWARDS)

I to II SEMESTERS

SCHEME OF EXAMINATIONS

SEMESTER - I										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL1C1/ 23UTL1C2/	Tamil Paper-I: / Tamil paper-I:	5	-	5	3	25	75	100	3
	23UHN1C1/ 23UHN1C2	Hindi Paper-I : / Hindi Paper-I								
	23UFR1C1 / 23UFR1C2	French Paper-I / French Paper-I								
II	23UEN1C1/ 23UEN1C2	English Paper-I/ English Paper-I	5	-	5	3	25	75	100	3
III	23UAI101	CC I: Programming in C	5		5	3	25	75	100	4
	23UAI102	CC II: Data Structures and Applications	4		4	3	25	75	100	4
	23UAI1A1/ 23UAI1A2	GE I – Allied I: Introduction to Linear Algebra / Discrete Mathematics	4		4	3	25	75	100	4
	23UAI103	CC Lab I: Programming in C Lab		5	5	3	20	30	50	2
IV	23EVS101	AECC I: Environmental Studies	1	-	1	-	-	-	-	-
	23HEC101	Human Excellence: Personal Values & SKY Yoga Practice - I	1	-	1	2	20	30	50	1
V		Extension Activities (NSS, NCC, Sports & Games, etc.,)	-	-	-	-	-	-	-	-
EC		Online Course(Optional) (MOOC / NPTEL / SWAYAM)								Grade
Total			30						600	21

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course

SEMESTER - II										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem .	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	23UTL2C2	TamilPaper-II	5	-	5	3	25	75	100	3
	23UHN2C2	Hindi Paper-II								
	23UFR2C2	French Paper-II								
II	23UEN202 / 23UEN203	Communication Skills – II (Level I) /Communication Skills – II (Level II)	5	-	5	3	25	75	100	3
III	23UAI204	CCIII: Java Programming	4		4		25	75	100	3
	23UAI205	CC IV: Operating Systems	4		4		25	75	100	3
	23UAI2A1/2 3UAI2A2	GE II – Allied II: Probability& Statistics / Optimization Techniques	4		4		25	75	100	3
	23UAI206	CCLab II: Java Programming Lab		4	4		20	30	50	2
	23UAI2S1/ 23UEL2S2	SEC I: Naan Mudhalvan: Industry 4.0/Professional Skills	2		2		20	30	50	2
IV	23EVS201	AECC I: Environmental Studies	1		2	2	-	50	50	2
	23HEC202	Human Excellence : Family Values & SKY Yoga Practice - II	1		2	2	20	30	50	1
V		Extension Activities (NSS,NCC,Sports& Games, etc.,)	-	-	-	-	-	-	-	-
EC	23CMM201	Manaiyiyal Mahathuvam-I			15 Hrs.	2	-	50	50	Grade
	23CUB201	Uzhavu Bharatham– I			15 Hrs.	2	-	50	50	Grade
	23UAI2VA	VAC-I			45 hrs					3*
					30 hrs					2*
		OnlineCourse(Optional)(MO OC/NPTEL/SWAYAM)								
Total			30						800	25

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course

CC – Core Course; GE – Generic Elective; AECC - Ability Enhancement Compulsory Course;

SEC – Skill Enhancement Course

Question Paper Pattern (Based on Bloom's Taxonomy)

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

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q1 – 5 MCQ) (Q6 – 10 Define / Short Answer / MCQ)	$10 * 1 = 10$	MCQ / Define	75
K3 (Q11-15)	B (Either or pattern)	$5 * 5 = 25$	Short Answers	
K4 & K5 (Q16 – 20)	C (Either or pattern)	$5 * 8 = 40$	Descriptive/ Detailed	

2. Theory Examinations: 38 Marks (3 Hours Examination) (Part III: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 - 10)	A (Q 1 – 10 MCQ)	$10 * 1 = 10$	MCQ	50 (Reduced to 38)
K3 (Q11 – 15)	B (Either or pattern)	$5 * 3 = 15$	Short Answers	
K4 & K5 (Q16-20)	C (Either or pattern)	$5 * 5 = 25$	Descriptive/ Detailed	

3. Theory Examinations: 38 Marks (2 Hours Examination) (Part IV: If applicable)

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1-10)	A (Q1 – 5 MCQ) (Q6–10 Define / Short Answer)	$10 * 1 = 10$	MCQ / Define	50 (Reduced to 38)
K3, K4 & K5 (Q11-15)	B (Either or pattern)	$5 * 8 = 40$	Descriptive/ Detailed	

4. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	50	20	30	10	05	05
Practical (Core / Elective)	75	30	45	20	05	05
Practical (Core / Elective)	100	40	60	30	05	05

5. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Project	100	25	50	25
Project	150	40	75	35
Project	200	50	100	50

* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)

THEORY

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Test 1	75	$(75+75+15+10)/7$	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

Maximum Marks: 50; CIA Mark: 12; CEE Mark: 38; (Part III: If applicable)

Components		Calculation	CIA Total
Test 1	50	(50+50+10+10)/10	12
Test 2 / Model	50		
Assignment / Digital Assignment	10		
Seminar	10		

PROJECT

Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;

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

** 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.

Continuous Internal Assessment for Project **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 25 is CIA and 75 is CEE Marks.

Mark Split UP

CIA	CEE	Total
25	75	100

S. No	Components for CIA	Marks
1	Review – I *	5
2	Review – II *	5
3	Review – III *	5
4	Rough Draft Submission	10
Total		25

* Review includes Objectives and Scope, Research Methodology, Literature Review, Data Analysis and Results, Discussion and Interpretation, Recommendations and Implications, Presentation and Format, Creativity and Originality, and Overall Impact and Contribution.

S. No	Components for CEE	Marks
1	Evaluation*	50
2	Viva-Voce	25
Total		75

* Evaluation includes Originality of Idea, Relevance to Current Trend, Candidate Involvement, Thesis Style / Language, and Presentation of Report.

Continuous Internal Assessment for Project **For Science Stream**

The Final year Science 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 200 marks, out of which 50 is CIA and 150 is CEE Marks.

Mark Split UP

CIA	CEE	Total
50	150	200

S. No	Components for CIA	Marks
1	Review – I *	10
2	Review – II *	10
3	Review – III *	10
4	Rough Draft Submission / Report Submission	20
Total		50

* **Review I:** - Problem Analysis

* **Review II:** - Data collection & Design

* **Review III:** - Data Analysis

S. No	Components for CEE	Marks
1	Evaluation *	100
2	Viva-Voce	50
Total		150

* Evaluation includes Problem and Hypothesis, Experimental Design / Materials / Procedure, Variables / Controls / Sample Size, and Data Collection / Analysis.

Continuous Internal Assessment for Project

For Computer Science Cluster

Maximum Marks: 100 Marks

Components for CIA: 25 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Planning Stage	05	25
II	Supporting Diagrams like system flowchart, ER, DFD, Usecase and Table Design OR UI and UX Design Application Architect and Prototyping	05	
III	Coding, Input forms, Output format, Testing OR Development, Testing	05	
IV	Preparation of Report & Submission	10	

Components for CEE: 75 Marks

ComponentsforCEE	Marks	Total	Grand Total
Evaluation			75
Title Relevance of the Industry/Institute	10	50	
Technology	10		
Design and Development Publishing	10		
Testing, Report	20		
Viva Voce			
Project Presentation	10	25	
Q&A Performance	15		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of the 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 the computer science lab as well as in the organization. The periodical review will be conducted to monitor the progress of the project work. The project report will be prepared and submitted at the end of the semester. An external examiner appointed by the Controller of Examination will conduct the viva voce examination along with a 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

Chapter No.	Title	Page No.
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i Certificates

ii Declaration

iii Acknowledgement

iv Synopsis

1. Introduction

1.1 Introduction

1.2 Objective of the Project

1.3 Company Profile

1.4 System Specification

1.4.1 Hardware Specification

1.4.2 Software Specification

2 System Study

2.1 Existing System

2.1.2 Drawbacks

2.2 Proposed System

2.3 Planning and Scheduling

3 System Design

3.1 Overview of the Project

3.2 Modules of the Project

3.3 Input Design Format

3.4 Output Design

3.5 Table Design

3.6 Supporting Diagrams (ER/DFD/Use Case)

4 Implementation and Testing

- 4.1 Coding Methods
- 4.2 Testing Approach
- 4.3 Implementation and Maintenance

5 Project Evaluation

- 5.1 Project Outcome
- 5.2 Limitations of the Project
- 5.3 Further Scope of the Project

6 Conclusion**7 Appendix**

- 7.1 Source Code
- 7.2 Screenshots and Reports

8 References**Size of the Project**

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

STUDENT SEMINAR EVALUATION RUBRIC**Grading Scale:**

A	B	C	D
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the 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 a grasp of information; answered only rudimentary Questions & Material not clearly related to the topic OR background dominated seminar

Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the 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 the audience	Refers to slides to make points; eye contact the majority of the 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 The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the 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
13-15	10-12	7-9	4-6	0-3

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 the writing is interesting	Hits in basic content and writing are 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 the topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to the topic * Informal language	* Word choice is vague * Writing language is not appropriate to the 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
Timeliness	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

SEMESTER I

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI101			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem	5	Core I: Problem solving and Programming in C	Semester:	I
					Credits:	4

Course Objective

The course provides insight knowledge about C programming language.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of C Language.	K2
CO2	Apply the control statements in programs	K2
CO3	Understand the representation and usage of arrays.	K2
CO4	Develop programs using functions and storage classes.	K3
CO5	Execute programs with pointers and files	K3

Mapping

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

Units	Content	Hrs
Unit I	Introduction to Programming: Computer Systems –Computer Hardware – Computer Software – Classification of Computer Software – Programming Languages – Generation of Programming Languages - Types of Computing Environments – Computer Languages – Language Translators – Creating and Running Programs - Pseudo code – Algorithm – Flow Charts – System Development- Overview of C – History of C -	15

	Features of C	
Unit II	Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - 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 & Associatively - Mathematical functions - Reading & Writing a character - Formatted input and output.	15
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 and Strings : Arrays-One Dimensional Array-Two Dimensional Arrays-Initializing Two Dimensional Arrays-Multi Dimensional Arrays-Handling of CharacterStrings-Declaring and Initializing String Variables-Reading Strings from terminal-Writing Strings to Screen-Arithmetic Operations on Characters-Putting Strings Together-Comparison of Two strings-String Handling Functions	15
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 Lifetime of Variables- Multi file Programs- Structures and Unions -Structures-Definition-Giving Values to membersStructure Initialization- Comparison of Structure Variables-Arrays of Structures-Arrays with Structures - Structures and Functions-Unions-Size of Structures	15
Unit V	Pointers and Files: Pointers - Declarations - Advantages of pointers - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Pointer arithmetic. File Management in C-Defining and Opening a File-Closing a File-I/O Operation on Files-Error Handling during I/O Operations-Random Access Files-File Inclusion-Compiler Control Directives.	15
	Total Contact Hrs	75

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	(7th Edn.), TMH	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ReemaThareja	Programming in C	(2nd Edn), Oxford University Press	2015
2	H. Schildt	“C: The Complete Reference”	(4th Edn), TMH	2000

Web References

<https://www.geeksforgeeks.org/generations-of-computers-computer-fundamentals/>

<https://opentextbc.ca/computerstudies/chapter/classification-of-generations-of-computers/>

<https://www.tutorialspoint.com/cprogramming/index.htm>

<https://www.javatpoint.com/c-programming-language-tutorial>

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. S. Niraimathi	Dr. S. Niraimathi	Mr. K. Srinivasan	Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI102			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Core II: Data Structures and Applications	Semester:	I
					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, linked 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	M
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 to Data Structures: History of Algorithm- Definition, Structure and Properties of Algorithms-Development of an Algorithm-Data Structures and Algorithms-Data Structure – Definition and	12

	classification. Analysis of Algorithms: Efficiency of Algorithms-Apriori Analysis-Asymptotic Notations-Time Complexity of an Algorithm using O Notation-Polynomial vs Exponential Algorithms-Average, Best and Worst case Complexities-Analyzing Recursive Programs.	
Unit II	Linear Data Structures: Arrays - Introduction—Arrays Operations – Number of Elements in an Array-Representation of Arrays in Memory-Applications. Stack: Introduction-Operations of Stack-Applications. Queue: Introduction-Operations of Queue -Circular Queues – other types of queues-Applications. Linked List: Introduction - Singly Linked Lists - Circularly Linked Lists - Doubly Linked Lists - Multiply Linked Lists –Applications.	13
Unit III	Non Linear Data Structures: Trees: Definition and Basic Terminologies -Representation of Trees - Binary Trees: Basic Terminologies and Types - Representation of Binary Trees - Binary Tree Traversals - Threaded Binary Trees – Application. Graphs: Introduction - Definitions and Basic Terminologies -Representations of Graphs - Graph Traversals - Applications.	12
Unit IV	Sorting: Introduction- Bubble Sort – insertion sort-Selection Sort – Merge Sort – shell Sort – Quick Sort – Heap Sort –Radix Sort	11
Unit V	Searching: Introduction -Linear Search – Transpose sequential search—Interpolation search-Binary Search – Fibonacci search-other search techniques.	12
	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	G AVijayalakshmi Pai	Data structures and Algorithms	McGraw Hill, 1 st Edition, ISBN: 9780070667266	20008
2	Horowitz, S. Sahni, and S. Rajasekaran	Computer Algorithms	Galgotia Pub. Pvt. Ltd.,	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T. H. Cormen, C. E. Leiserson, R. L. Rivest	Introduction to Algorithms	Prentice hall, 3 rd Edition	2009

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.B.Azhagusundari	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc,			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI1A1			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	4	General Elective I: Introduction to Linear Algebra	Semester:	I
					Credits:	4

Course Objective

To introduce the concepts of Numbers, Quantification, sets, logical reasoning, probability and calculus

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Define basic terms and concepts of matrices.	K1
CO2	Comprehend the use of various matrix operations	K2
CO3	Understand the concept of Vector spaces and Basis	K3
CO4	Determine Eigen values and Eigen Vectors	K4
CO5	Determine orthogonal set concept	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	M
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	Systems of Linear equations:– Row Reduction and Echelon forms – Vector Equations : Vector Equation – The matrix Equation $Ax = b$ – Solution sets of Linear systems	12
Unit II	Matrix Operations: The Inverse of a Matrix – Characterizations of Invertible Matrices – Partitioned Matrices – Matrix Factorizations.	12

Unit III	Vector Spaces and Subspaces: Null spaces, Column Spaces and Linear Transformations – Linearly Independent Sets, Bases – coordinate systems – The Dimension of a vector space – Rank.	12
Unit IV	Eigen vectors and Eigen values – The Characteristic Equation – Diagonalization – Eigen vectors and Linear transformations	12
Unit V	Innerproduct, Length and Orthogonality – Orthogonal sets – Orthogonal Projections- The Gram – Schmidt Process.	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	David C. Lay Steven R. Lay and Judi J. McDonald	Linear Algebra and Its Applications,	Pearsons Publications 5th edition x	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	. Surjeetsingh, Qazi Zameeruddin,	Modern Algebra	Vikas Publishing House, 8 th edition	2006
2	Seymore Lipschutz	Beginning Linear Algebra	Tata Mcgraw hill,	2005.
3	S.G. Venkatachalapathy	Modern Algebra	Margham Publications	2008.
4	Ward Cheney David E. Ward Kincaid,	Linear Algebra Theory and Applications,		I edition 2010

		Curriculum Development Cell	Controller of the Examination
Course Designed by	Head of the Department		
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Name: Mr.Earnest Rajadurai	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	23UDA2A1			Title	Batch:	2023 - 2026	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	4	General Elective II: Discrete mathematics	Semester:	II	
					Credits:	4	

Course objectives

This course has been designed for students to learn and understand

- the logic and Proof
- basic concept of counting and graph
- apply the concept of counting Techniques

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	K2
CO2	Demonstrate an understanding of relations ,functions, Combinations and lattices	K3
CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	K4
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	K5
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	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	M
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	Relations: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	12
Unit II	Coding Theory: Introduction – Hamming distance – Encoding a Message – Group codes – Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	12
Unit III	Mathematical Logic: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	12
Unit IV	Graph Theory :Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal's algorithm to find an optimal tree of a weighted graph.	12
Unit V	Number Theory: Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid's theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	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	Dr. M. K. Venkataraman, Dr. N. Sridharan, N. Chandarasekaran	Discrete Mathematics	The National Publishing Company Chennai	2006
2	S. Kumaravelu & SusheelaKumaravelu	Graph Theory	JankiCalender Corporation, Sivakasi,	1999
3	Kumaravelu and SuseelaKumaravelu	Elements of Number Theory	Raja Sankar offset Printers.	2002

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	Discrete Mathematical Structures with Applications to Computer Science	McGraw Hill International Edition	2007
2	Dr. A. Singaravelu, Dr.V.Ravichandran, Dr. T.N. Shanmugam	Discrete Mathematics	Meenakshi agency 5th edition	2008
3	NarsinghDeo	Graph Theory with applications to engineering and computer science	, Prentice hall of India, New Delhi, 2	2003

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: Mr.Earrest Rajadurai	Name:Dr.S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI103			Title	Batch:	2023 – 2026
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	5	Core Lab I : Programming Lab in C	Semester:	I
					Credits:	2

Course Objective

- To practice the fundamental programming methodologies in the C programming language via laboratory experiences.
- To code, document, test, and implement a well-structured, robust computer program using the C programming language.
- To prepare students to face the challenges and opportunities in the IT industry by building strong foundations in C programming language..

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.	K3
CO2	Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions	K4
CO3	Role of Functions involving the idea of modularity.	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
	Implement programs using I/O Statements. Create programs with C Operators. Develop C program using Conditional statements. Build C programs using Looping statements.

	Implement the Arrays, Stack and Queue in C. Write a C program using Functions. Implement the String handling functions in C. Experiments Pointers and storage classes in C. Implement C program using Structures. Programs using Unions. Create files using File handling operations in C. Write C program using Command line arguments. Implement the sorting and searching algorithms in C
	Total Hours 75

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

SEMESTER II

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	23UAI204			Title	Batch:	2023 - 2026	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Core III: Programming in Java	Semester:	II	
					Credits:	4	

Course Objective

The course provides insight knowledge about object oriented programming concepts and programming language in Java

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Develop an in-depth understanding of object-oriented programming concepts	K2
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	M
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	Principles of object oriented programming: Software Evolution – Procedure Oriented Programming – Object-Oriented Programming Paradigm – Key Concepts of Object-Oriented Programming – Benefits of OOP – Object-Oriented Languages – Applications of OOP.	12
Unit II	Java Evolution-Overview of Java Language-Constants, Variables & Data types Operators & Expressions-Decision making & branching-Decision making & looping.	13
Unit III	Classes, Objects & methods- Arrays, Strings & Vectors-Interfaces: Multiple Inheritance – Packages: Putting classes together - Multithreaded Programming	12
Unit IV	Packages: Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Multithreading.	11
Unit V	Managing Input/ Output in files in Java: Introduction-Concept of Streams-Stream Classes-Byte Stream classes-Character Stream Classes-Using Streams-other useful I/O Classes- using the File Class-I/O Exceptions-Creation of Files-Reading/Writing Characters - Reading/Writing Bytes.	12
	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	R.Nageswara Rao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
2	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I - Fundamentals	Oracle Press Java,12 th Edition.	2022
3	H. Schildt	Java2 The Complete Reference	MCGraw Hill, 11 th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	TheJava Programming Language	Addison Wesley,4 th Edition	2005

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI205			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		Operating systems	Semester:	II
					Credits:	4

Course Objectives

- This course has been designed for students to learn and understand The main components and their functions of Operating Systems
- The concept of process management, scheduling, IPC and Deadlocks.
- The need for special purpose operating systems

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize the components of an OS and their functions.	K2
CO2	Understand the CPU process management policies.	K2
CO3	Apply the scheduling algorithms for CPU scheduling	K3
CO4	Analyze the various memory management policies	K4
CO5	Articulate the various Input and Output management policies	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	M
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

Unit	contents	Hours
I	Introduction to Operating Systems : Introduction - history of operating system-processors - computer hardware - memory - disk - input and output devices - buses - different kinds of operating system – Operating system concepts - System calls-Operating system structure - monolithic - layered - microkernel - client/server models - virtual machines.	12
II	Processes & Threads : Processes -process model -process creation - process termination -process hierarchies - process states- threads - thread model and usage- classical thread model- inter process communication - race conditions - critical regions - mutual exclusion - semaphores	12
III	Scheduling and Memory Management : Introduction to scheduling - scheduling in batch systems - interactive systems -realtime systems - Memory Abstraction -notion of an address space -swapping - managing free space - Virtual Memory - Page replacement algorithms - design issues for paging systems - segmentation	12
IV	Deadlocks :Resources- introduction to deadlocks - conditions for deadlocks-deadlock modeling - deadlock detection and recovery - deadlocks avoidance - deadlock prevention. Multiple processor system: multiprocessors -hardware's - operating system types synchronization - scheduling - multi computers -distributed systems.	12
V	I/O Management : Principles of I/O hardware -I/O devices - device controllers -memory mapped I/O - DMA - principles of I/O software - goals of I/O software-programmed I/O - interrupt -driven I/O - Files systems: Files - directories - files systems implementation - File System Management and Optimization.	12
Total		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	Andrew S. Tanenbaum	"Modern Operating Systems"	4th Edition, PHI New Delhi.	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	William Stallings	"Operating Systems - Internals & Design Principles"	(9th Edition, PHI private Ltd, New Delhi	2018

2	Abraham Silberschatz, Greg Gagne, Peter B. Galvin	Operating Systems Concepts	10th Edition, John Wiley	2018
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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. B.Azhagusundari Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Dr. R .ManicaChezian Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UDA2A1			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	General Elective I: Probability and Statistics	Semester:	II
					Credits:	4

Course Objective

This course has been designed for students to learn and understand

- Basic concepts of Probability theory
- Apply the concepts to solve the probability problems
- Concepts of Regression and Correlation

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the concept of probability theory	K2
CO2	Identify the problem-solving random variable and probability function	K2
CO3	Apply the knowledge of Probability distribution	K3
CO4	Identify the sampling distributions	K3
CO5	Interpret the concept of correlation and regression	K3

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: Introduction- Sample spaces- Events- The probability of events-Some rules of probability- Conditional probability- Independent Events- Bayes theorem- The theory and practice.	12
Unit II	Random Variable : The expected value of a random variable –Moments –Chebyshev's theorem - Moment Generating Function-Product of moments- Moments of linear combinations of random variables- Conditional expectations- The theory and practice	11
Unit III	Special Probability Distribution : The Discrete uniform, Binomial, Poisson, Hyper Geometric, Geometric and Negative Binomial distributions. Special Probability Densities: Uniform, Normal, Exponential, Gamma, Beta and Bivariate normal distributions.	12
Unit IV	Sampling Distribution: The distribution of the mean – Finite populations- The chi-square distribution – The t distribution- The F distribution- Order Statistics- The theory and practice.	12
Unit V	Regression and Correlation : Introduction- Linear regression- The method of Least squares-Normal Regression Analysis- Normal Correlation Analysis- Multiple Linear regression- The theory and practice.	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	John E. Freund's	“Mathematical Statistics with Applications “	8th Edition, Prentice Hall of India, New Delhi	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert. V. Hogg and Allen T.G. Craig	“Introduction to Mathematical Statistics”,	5th edition, Pearson Education	2006
2	Suddhebdur Biswas and G.L. Sriwastav.	“Mathematical Statistics”,	1st Edition, Narosa Publishing House Pvt. India.	2009
3	Nababdu Pal and Sahadeb Sarkar	”Statistics	2nd Edition, Prentice Hall of India, New Delhi	2009
	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying E. Ye,	“Probability and Statistics for Engineers and Scientists	., 9th edition, Pearson Education	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:Mr.Earner Rajadurai	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UDA2A2			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	General Elective II: Optimization Techniques	Semester:	II
					Credits:	4

Course Objectives

Mathematical Foundation course Solves

- Modeling linear programs and solving with a computer
- Simplex algorithms to solve linear programs
- Other algorithms for linear programming
- Integer Programming, Network problems, Non-linear programming

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 principles and practices of computing grounded in mathematics and science	K2
CO2	To understand the Problems using various linear Algorithms	K3
CO3	To apply algorithms to the decision making problems	K4
CO4	To Analyse the programming algorithms with exercises	K5
CO5	To Summarize the inventory and queuing models	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	M
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	Introduction: Simplex method – Graphical method – Standard form – IBFS- Artificial Variable technique – big M	12
Unit II	Transportation : Mathematical formulation – Initial feasible solution – North – West Corner Method – Matrix minima method – Vogel’s approximation method – Optimized basic feasible solution- Solution by UV method Assignment Problem : Introduction – Definition – Assignment algorithm – Balanced Assignment Problem – Unbalanced Assignment problem – Hungarian Method	12
Unit III	Networks : Networks and basic components – rules – time calculation in networks – CPM – PERT – PERT Calculations- Resource analysis in network scheduling project cost – time cost optimization algorithm	12
Unit IV	Inventory : Introduction – Reasons for carrying Inventory – Type of Inventories – The Inventory decision – EOQ with no Shortages – Production problem with no shortages – EOQ with Shortages – Production problem with shortages- EOQ with Price Breaks – EOQ with no price breaks – EOQ with two price breaks Queuing Theory : Queuing System characteristics – Poisson process and exponential distribution (M/M/1) : (α /FIFO) , (M/M/1) : (N/FIFO) , (M/M/C) : (α / FIFO) , (M/M/C) : (N/FIFO)	12
Unit V	Sequencing : Introduction- problems of sequencing – problems with n jobs and two machines – Problems with n jobs and three machines – problems with n jobs and m machines Replacement Theory : Introduction – replacement of equipment or asset the deteriorates gradually – replacement of equipment that fails suddenly	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	KantiSwarup, P.K. Gupta and Man Mohan,	Operations Research	Sultan Chand & Sons Educational Publishers, New Delhi	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	. P.K. Gupta, D.S. Hira	Problem in Operations Research	S.Chand& Company Ltd	2007
2	J.K. Sharma	Operations Research Theory and Applications	Third Edition, Macmillan India Ltd	2006
3	Hamdy A. Taha	Operations Research : An Introduction	Eight Edition PHI, New Delhi,	2008

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: Mr.Earnest Rajadurai	Name:Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI206			Title	Batch:	2023 - 2026
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Core Lab II Programming Lab in Java	Semester:	II
					Credits:	2

Course Objective

- To make the student learn an object oriented way of solving problems using java.
- To make the students to write programs using multithreading concepts and handle exceptions.
- To make the students to write programs that connects to a database and be able to perform various front-end operations.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the object oriented concepts	K3
CO2	To get the idea of packages, interfaces and exceptions and AWT	K4
CO3	To validate the projects using front-end and back-end programming	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

Content
Program to generate Fibonacci series Program to check if the number is prime or not Program to find the factorial of a number Program to emulate a Simple calculator Program to check if the string is a Palindrome or not Program to check if the year is a Leap Year Program to check if the number is an Armstrong number or not Program to demonstrate Multilevel Inheritance.

Program to demonstrate Method Overloading. Program to demonstrate Method Overriding. Dynamic Method dispatch. Program to demonstrate interfaces. Program to demonstrate packages. Program to demonstrate user-defined exception. Program to demonstrate Multi-threading concept. Applet program to demonstrate basic controls
Total Hours 60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R.Nageswara Rao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
2	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I - Fundamentals	Oracle Press Java, 12 th Edition.	2022
3	H. Schildt	Java2 The Complete Reference	MCGraw Hill, 11 th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	The Java Programming Language	Addison Wesley, 4 th Edition	2005

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.S.Niraimathi	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI2S1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem .		SEC I: Naan Mudhalvan : Industry 4.0	Semester:	I
					Credits:	4

Course Objective

To impart knowledge on Industry 4.0, need for digital transformation and the following Industry 4.0 tools: 1. Artificial Intelligence 2. Big Data and Data Analytics 3. Internet of Things

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Know the reason for adopting Industry 4.0 and Artificial Intelligence.	K1
CO2	Understand the need for digital transformation.	K2
CO3	Apply the industry 4.0 tools.	K3
CO4	Analyze the applications of Big Data.	K4
CO5	Examine the applications and security of IoT Applications.	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	M
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	L
CO5	H	M	H	H	L	L	M	L	M	H	H	M

Units	Content	Hrs
Unit I	Industry 4.0: Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.	6
Unit II	Artificial Intelligence : Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI -environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI .	6
Unit III	Big Data and IoT : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications	6
Unit IV	Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT .	6
Unit V	Applications And Tools Of Industry 4.0: Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society.	6
	Total Contact Hrs	30

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	P.Kaliraj& T. Devi Related Online	Higher Education for Industry 4.0 and Transformation to Education 5.0	Contents [MOOC, SWAYAM, NPTEL, Websites etc.] 1 https://nptel.ac.in/courses/106/105/106105195/	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers	Intel® Galileo and Intel® Galileo Gen 2:, Apress	2014
2	Marco Schwartz Yun	Internet of Things with the Arduino	Packt Publishing,	2014

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. B.Azhagusundari	Dr. S. Niraimathi	Mr. K. Srinivasan	Dr. R .ManicaChezian
Signature	Signature	Signature	Signature


Dr. R. MUTHUKUMARAN,
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 Coimbatore District


Dr. S. NIRAIMATHI, M.C.A., M.Phil., Ph.D.,
 Associate Professor & Head,
 Department of Computer Science with AI & ML
 N.G.M. College, Pollachi - 642 001.

DEPARTMENT OF COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

**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 ARTIFICIAL INTELLIGENCE &
MACHINE LEARNING**

BATCH 2022-2025

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 ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Vision

To be a leading school of emerging trends in Artificial Intelligence and Machine Learning that affords quality education to equip students with the technical know-how, ascertain their hidden talents, provide ambient environment to show case their highest potential and to transform the students to be creative and innovative leaders and entrepreneurs as anticipated by the Industry

Mission

- To offer a broad and balanced academic plans that strengthens and emphasizes high quality and creative instruction
- To strive for quality education that will prepare young minds for imbibing knowledge, skills and sensitivity.
- To create a platform for students for exploring their creative potential and nurturing the spirit of entrepreneurship and critical thinking.
- To inculcate a strong belief in hard work and equip students with the skills needed to adapt better to the changing global scenario and gain access to multiple career opportunities.

- To generate new domain knowledge through a broad array of scholarly, research and creative endeavors, which provide the basis to uncover the immediate and long-term needs of the Industry.
- To offer opportunities and encourage the students to Initiate, sustain and nourish research groups in Artificial Intelligence.
- To motivate the budding professionals in exploiting the potential of start-ups and innovations in Artificial Intelligence & Machine Learning and the related Domains.
- To maintain level of excellence and standards that offers them statewide, national and international significance.

Program Educational Objectives (PEOs)	
The B.Sc. Computer Science with Artificial Intelligence & Machine Learning program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Expertise with the principles of Artificial Intelligence and problem solving, inference, perception, knowledge representation, and learning
PEO2	Exhibit high standards with regard to application of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning and deep learning models
PEO3	Investigate with a machine learning model for simulation and analysis and explore the scope, potential, limitations, and implications of intelligent systems.
PEO4	Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.
PEO5	Instill key technologies in Artificial Intelligence, Machine Learning and deep learning, visualization techniques, Natural language processing and Robotics.

Programme Outcomes (POs)	
On successful completion of the B.Sc. Computer Science with Artificial Intelligence & Machine Learning	
PO1	Domain Knowledge: Demonstrate a sound understanding of all the main areas of Machine Learning & AI and also demonstrate the ability to exercise critical judgement in the evaluation of Machine Learning and AI applications.
PO2	Problem Analysis: Understand how to distill a real-world challenge as an artificial intelligence problem, involving explicit representation and learning of symbolic and numeric models; reasoning about such models; and using such models for decision making, action selection, and interaction with humans.
PO3	Design/development of solutions: Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	Communicative & oratorical Skills: Establish the ability to Listen, read, proficiently communicate and articulate complex ideas with respect to the needs and abilities of diverse audiences.

PO5	Exhibit Entrepreneurial Skills: Deliver innovative ideas to instigate new business ventures and possess the qualities of a good entrepreneur
PO6	Ethics: Recognize the social impact of artificial intelligence and the underlying responsibility to consider the ethical, privacy, moral, and legal implications of artificial intelligence technologies.
PO7	Individual and teamwork: Graduates will be able to undertake any responsibility as an individual/member of multidisciplinary teams and have an understanding of team leadership
PO8	Use of State-of-the-Art AI and machine learning tools & techniques: Design, analyze, implement, and use state-of-the-art AI and machine learning tools & techniques for dealing with real-world data, including data involving vision, language, perception, and uncertainty.
PO9	Dynamism and Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PO10	Research instinct: Apply AI and ML specific research techniques, tools, methods, design of experiments, analysis and synthesis of the information for conducting investigations of complex problems.

Program Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Computer Science with Artificial Intelligence and Machine Learning program, the students are expected to	
PSO1	Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards for Artificial Intelligence and Machine Learning professional.
PSO2	Apply the technical and critical thinking skills in the discipline of artificial intelligence and machine learning to find solutions for complex problems. Design and develop research-based solutions for complex problems in artificial intelligence and machine learning industry through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.

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

B.Sc. – COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE & MACHINE LEARNING									
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			CI A	ESE	
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: Java Programming	4		3	50	50	100	4
	22UAI102	Core II: Industry 4.0	4		3	50	50	100	4
	22UAI1A1	General Elective-1: Introduction to Linear Algebra	4		3	50	50	100	4
	22UAI103	Core Lab I: Programming Lab in Java		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

<u>II SEMESTER</u>									
Part	Course Code	Title of the Paper	Hours/ Week		Exam Hours	MAX.MARKS			Credits
			T	P		CI A	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	22UAI204	Core III: Programming in Python	3		3	50	50	100	4
	22UAI205	Core IV: Data Structures & Algorithms	4		3	50	50	100	4
	22UAI2A1	General Elective 2 : Optimization techniques	5		3	50	50	100	4
	22UAI206	Core Lab II: Programming Lab in Python		4	3	25	25	50	2
	22UAI207	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

Part	Course Code	Title of the Paper	Hrs/Week		Exam Hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
III SEMESTER									
I	22UTL303/ 22UHN303/ 22UFR303	Tamil Paper-III/ Hindi Paper-III/ French Paper-III	3		3	50	50	100	3
II	22UEN303	English Paper – III	3		3	50	50	100	3
III	22UAI308	Core V: Database System Concepts	5		3	50	50	100	3
	22UAI309	Core VI: Introduction to AI	5		3	50	50	100	3
	22UAI3A1/ 22UAI3A2	General Elective 3 : Discrete structures and its Application/Numerical techniques	4		3	50	50	100	3
	22UAI310	Core Lab III: Database System Concepts Lab		4	3	25	25	50	2
	22UAI311	Core Lab IV: AI Lab		4	3	25	25	50	2
IV	22HEC303	Human Excellence Paper: Professional Values& SKY Yoga Practice-3		1	2	20	30	50	1
	22UAI3N1 / 22UAI3N2	Non-Major Elective Paper I: Internet Concepts / Data Processing Through Excel Lab		1	2	-	50	50	2
V		Extension Activities (NSS, NCC, Sports & Games, etc.,)	-	-	-	-	-	-	-
	22CMM302	Manaiyiyal Mahathuvam-II	15 hrs certificate course						
	22CUB302	Uzhavu Bharatham – II	15 hrs certificate course						
Total			30					700	22

Part	Course Code	Title of the Paper	Hrs/ Week		Exam hrs	MAX.MARKS			Credits
			T	P		CIA	ESE	Total	
IV SEMESTER									
I	22UTL404/ 22UHN404/ 22UFR404	Tamil Paper-IV/ Hindi Paper-IV/ French Paper-IV	3		3	50	50	100	3
II	22UEN403	English Paper – IV	3		3	50	50	100	3
III	22UAI412	Core VII: Cloud Computing	4		3	50	50	100	3
	22UAI413	Core VIII: Introduction to Machine Learning	4		3	50	50	100	3
	22UAI4A4	General Elective 4: Mathematics for ML	4		3	50	50	100	3
	22UAI414	Core Lab V: ML Lab		5	3	20	30	50	2
	22UAI415	Capstone Project – 2		1		20	30	50	2
	22UAI416	SEC II: Naan Mudhalvan / Block Chain		2	2	20	30	50	2
IV	22HEC404	Human Excellence Paper : Social Values & SKY Yoga Practice-4		1	2	20	30	50	1
	22UAI4N1	Non-Major Elective Paper-II: Web Technology lab /WEB APPLICATION using Photoshop		1	2	-	50	50	2
V		Extension Activities (NSS, NCC, Sports & Games, etc.,)						50	1
	22CMM403	Manaiyiyal Mahathuvam-III	1	-	2	-	50	50	Grade
	22CUB403	Uzhavu Bharatham – III	1	-	2	-	50	50	Grade
	22UAIVA	VAC II: Python for Data Science							2*
		Total	30					800	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**

Chapter No.	Title	Page No.
i	Certificates	
ii	Declaration	
iii	Acknowledgement	
iv	Synopsis	
1.	Introduction	
	1.1 Introduction	
	1.2 Objective of the Project	
	1.3 Company Profile	
	1.4 System Specification	
	1.4.1 Hardware Specification	
	1.4.2 Software Specification	
2	System Study	
	2.1 Existing System	
	2.1.2 Drawbacks	
	2.2 Proposed System	
	2.3 Planning and Scheduling	
3	System Design	
	3.2 Overview of the Project	
	3.1 Modules of the Project	
	3.2 Input Design Format	
	3.3 Output Design	
	3.4 Table Design	
	3.5 Supporting Diagrams (ER/DFD/Use Case)	
4	Implementation and Testing	
	4.1 Coding Methods	
	4.2 Testing Approach	
	4.3 Implementation and Maintenance	
5	Project Evaluation	
	5.1 Project Outcome	
	5.2 Limitation of the Project	
	5.3 Further Scope of the Project	
6	Conclusion	
7	Appendix	
	7.1 Source Code	
	7.2 Screenshots and Reports	
8	References	

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 AI & ML)	
Course Code:	22UAI101			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem .	60	Core I: Java Programming	Semester:	I
					Credits:	4

Course Objective

The course provides insight knowledge about object oriented programming concepts and programming language in Java.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Develop an in-depth understanding of object-oriented programming concepts	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	H	H	H	H	L	M	L	M	L	H	H

CO3	M	H	M	H	M	L	M	M	M	L	M	H
CO4	M	H	M	H	M	L	H	L	M	L	M	H
CO5	H	M	H	H	L	L	M	L	M	H	H	H

Units	Content	Hrs
Unit I	INTRODUCTION: Introduction to Java - Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.	12
Unit II	Classes and Objects: Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class.	11
Unit III	Packages: Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading.	12
Unit IV	I/O Streams: File Streams - Applets - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation .	12
Unit V	Networks basics: Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL – Datagrams - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus.	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	R.Nageswara Rao	Core Java : An Integrated Approach	John Wiley, ISBN 9789351199250	2016
2	Cay S.Horstmann, Gary Cornell.	Core Java 2 Volume I - Fundamentals	Oracle Press Java, 12 th Edition.	2022
3	H. Schildt	Java2 The Complete Reference	McGraw Hill, 11 th Edition	2020

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Deital&Deital	Java How to Program	Third Edition, Pearson Education Asia	2012
2	K. Arnold and J. Gosling	The Java Programming Language	Addison Wesley, 4 th Edition	2005

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. S. Niraimathi	Dr. S. Niraimathi	Mr. K. Srinivasan	Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI102			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	60	Core II: Industry 4.0	Semester:	I
					Credits:	4

Course Objective

To impart knowledge on Industry 4.0, need for digital transformation and the following Industry 4.0 tools: 1. Artificial Intelligence 2. Big Data and Data Analytics 3. Internet of Things

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Know the reason for adopting Industry 4.0 and Artificial Intelligence.	K1
CO2	Understand the need for digital transformation.	K2
CO3	Apply the industry 4.0 tools.	K3
CO4	Analyze the applications of Big Data.	K4
CO5	Examine the applications and security of IoT Applications.	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	M
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	L
CO5	H	M	H	H	L	L	M	L	M	H	H	M

Units	Content	Hrs
Unit I	Industry 4.0: Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.	12
Unit II	Artificial Intelligence : Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI -environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI .	11
Unit III	Big Data and IoT : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use cases Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills -Big Data Roles - Learning Platforms; Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT .	12
Unit IV	Applications And Tools Of Industry 4.0: Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics.	12
Unit V	Jobs 2030: Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 - Framework for aligning Education with Industry 4.0 .	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	P.Kaliraj& T. Devi Related Online	Higher Education for Industry 4.0 and Transformation to Education 5.0	Contents [MOOC, SWAYAM, NPTEL, Websites etc.] 1 https://nptel.ac.in/courses/106/105/106105195/	2020

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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers	Intel® Galileo and Intel® Galileo Gen 2:, Apress	2014
2	Marco Schwartz Yun	Internet of Things with the Arduino	Packt Publishing,	2014

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	Dr. S. Niraimathi	Mr. K. Srinivasan	Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc,			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI1A1			Title	Batch:	2022 – 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem	60	Allied I :Introduction to Linear Algebra	Semester:	I
					Credits:	4

Course Objective

To introduce the concepts of Numbers, Quantification, sets, logical reasoning, probability and calculus

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Define basic terms and concepts of matrices.	K1
CO2	Comprehend the use of various matrix operations	K2
CO3	Understand the concept of Vector spaces and Basis	K3
CO4	Determine Eigen values and Eigen Vectors	K4
CO5	Determine orthogonal set concept	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	M
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	Systems of Linear equations: – Row Reduction and Echelon forms – Vector Equations : Vector Equation – The matrix Equation $Ax = b$ - Solution sets of Linear systems	12
Unit II	Matrix Operations: The Inverse of a Matrix – Characterizations of Invertible Matrices – Partitioned Matrices – Matrix Factorizations.	12
Unit III	Vector Spaces and Subspaces: Null spaces, Column Spaces and Linear Transformations – Linearly Independent Sets, Bases – coordinate systems – The Dimension of a vector space – Rank.	12
Unit IV	Eigen vectors and Eigen values: The Characteristic Equation – Diagonalization – Eigen vectors and Linear transformations	12
Unit V	Innerproduct, Length and Orthogonality: Orthogonal sets – Orthogonal Projections- The Gram – Schmidt Process.	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	David C. Lay Steven R. Lay and Judi J. McDonald	Linear Algebra and Its Applications	Pearsons Publications 5th edition	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ward Cheney David Kincaid	Linear Algebra Theory and Applications,	Jones and Bartlett Publishers, Inc, II edition.	2011

2	Seymorelipschutz	Beginning Linear Algebra	Tata Mcgraw hill	2005
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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: Mr S. Earnest Rajadurai	Name:Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI103			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Core Lab I Programming Lab in Java	Semester:	I
					Credits:	2

Course Objective

- To make the student learn an object oriented way of solving problems using java.
- To make the students to write programs using multithreading concepts and handle exceptions.
- To make the students to write programs that connects to a database and be able to perform various front-end operations.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember and recollect the object oriented concepts	K3
CO2	To get the idea of packages, interfaces and exceptions and AWT	K4
CO3	To validate the projects using front-end and back-end programming	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
	1. Program to generate Fibonacci series 2. Program to check if the number is prime or not 3. Program to find the factorial of a number 4. Program to emulate a Simple calculator 5. Program to check if the string is a Palindrome or not 6. Program to check if the year is a Leap Year 7. Program to check if the number is an Armstrong number or not 8. Program to demonstrate Multilevel Inheritance. 9. Program to demonstrate Method Overloading. 10. Program to demonstrate Method Overriding. 11. Dynamic Method dispatch. 12. Program to demonstrate interfaces. 13. Program to demonstrate packages. 14. Program to demonstrate user-defined exception. 15. Program to demonstrate Multi-threading concept. 16. Applet program to demonstrate basic controls 17. Program to demonstrate font class. 18. Program to demonstrate Graphics class. 19. Program to demonstrate layout manager. 20. Program to create Menus. 21. Program to demonstrate animation. 22. Program to demonstrate mouse events and keyboard events
	Total Hours 75

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

SEMESTER II

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UAI204			Title	Batch:	2022 - 2025	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core III: Programming in Python	Semester:	II	
					Credits:	4	

Course Objective

To impart knowledge in Core python, advanced concepts like Regular Expressions and Artificial Intelligence & Data Science tools which allow students to apply the concepts to become effective Python programmers.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the core programming constructs of Python	K1
CO2	Express proficiency in the handling of functions, strings,lists, dictionaries, tuples and sets	K2
CO3	Apply the use of regular expressions and built-in functionsto navigate the file system.	K3
CO4	Illustration of Object-oriented Programming conceptsin Python	K4
CO5	Realize the power of modules like NumPy, pandas, and Altair in developing solutions to problems related to data science	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	M
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	Introduction: Identifiers - Keywords - Statements and Expressions - Variables - Operators - Precedence and Associativity - Data Types - Indentation - Comments - Reading Input - Print Output - Type Conversions - The type() Function and Is Operator - Dynamic and Strongly Typed Language. Control Flow Statements - Functions: Built-In Functions - Commonly Used Modules - Function Definition and Calling the Function - The return Statement and void Function- Scope and Lifetime of Variables - Default Parameters - Keyword Arguments - *args and **kwargs - Command Line Arguments.	12
Unit II	Strings : Creating and Storing Strings - Basic String Operations - Accessing Characters in String by Index Number - String Slicing and Joining - String Methods - Formatting Strings – Lists: Creating Lists - Basic List Operations - Indexing and Slicing in Lists - Built-In Functions Used on Lists - List Methods - The del Statement.	11
Unit III	Dictionaries: Creating Dictionary - Accessing and Modifying key:valuePairs in Dictionaries - Built- In Functions Used on Dictionaries - Dictionary Methods - The del Statement - Tuples and Sets:Creating Tuples - Basic Tuple Operations - Indexing and Slicing in Tuples - Built-In Functions Used on Tuples - Relation between Tuples and Lists -Relation between Tuples and Dictionaries - Tuple Methods - Using zip() Function - Sets - Set Methods – Frozenset.	12
Unit IV	Files: Types of Files - Creating and Reading Text Data - File Methods to Read and Write Data - Reading and Writing Binary Files - The Pickle Module - Reading and Writing CSV Files - Python os and os.path Modules Regular Expression Operations: Using Special Characters - Regular Expression Methods - Named Groups in Python Regular Expressions - Regular Expression with glob Module.	12
Unit V	Object-Oriented Programming: Classes and Objects - Creating Classes in Python - Creating Objects in Python - The Constructor Method - Classes with Multiple Objects - Class Attributes versus Data Attributes - Encapsulation - Inheritance - The Polymorphism –Introduction to Data Science: Functional Programming - JSON and XML in Python - NumPy with Python - Pandas – Altair.	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	S. Gowrishankar, A. Veena,	Introduction to Python Programming,	CRC Press Taylor and Francis Group, Ist Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	, Pearson Education, 2nd Edition	2009

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UAI205			Title	Batch:	2022 - 2025	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core IV: Data Structures and Algorithms	Semester:	II	
					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, linked 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	M
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 to Data Structures: Why Data Structures – Operations of Data Structures – Data Types – Arrays and Lists – Representation Of Arrays – Operations On Arrays - Abstract Data Types (ADTs) – List ADT.	12
Unit II	Linear Data Structures: Stack: Operations of Stack – Representation – Implementation – Infix to Postfix Conversion – Postfix Evaluation – Recursion – Maze Problem – Queue: Operations of Queue – Representation – Implementation – Job Processing using Queue – Circular Queue – Double Ended Queue – Linked List: Representation – Implementation – Polynomial Addition – Doubly Linked List – Circular List – Circular Doubly Linked List.	11
Unit III	Non Linear Data Structures: Trees: Terminologies in Trees – Representation – Types of Trees – Forest – Transforming Forest into Binary Trees - Traversal Techniques – Applications of Trees Graphs: Terminologies in Graphs – Representation – Depth First Search – Breadth First Search – Applications of Graphs – Shortest Path- Travelling Salesman Problem – Dijkstra's Algorithm – Types of Graphs.	12
Unit IV	Sorting And Searching: Sorting: Bubble Sort – Selection Sort – Merge Sort – Insertion Sort – Quick Sort – Heap Sort – Searching: Linear Search – Binary Search – Divide and Conquer – Hashing - Hash Table – Direct Address Method – Mapping Function – Handling Collision.	12
Unit V	Complexity And Case Studies: Asymptotic Notation – Big Oh Notation – Omega Notation – Theta Notation – Complexity: Space Complexity – Time Complexity – Space and Time Complexities of Data Structures – Case Studies: Searching for Patterns- Inventing a new sorting Algorithm - Synthesizing Concurrent Graph Data Structures.	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	GavPai,	Data structures and algorithms, concepts, techniques and Applications	McGraw Hill, 1 st Edition, ISBN: 9780070667266	2019
2	Horowitz, S. Sahni, and S. Rajasekaran	Computer Algorithms	Galgotia Pub. Pvt. Ltd.,	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	T. H. Cormen, C. E. Leiserson, R. L. Rivest	Introduction to Algorithms	Prentice hall, 3 rd Edition	2009

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.S.Niraimathi	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UDA2A1			Title	Batch:	2022 - 2025	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	ALLIED II: Optimization Techniques	Semester:	II	
					Credits:	4	

Course Objective

- To model linear programs and solving with a computer
- To use Simplex algorithms to solve linear programs & Other algorithms for linear programming,
- To introduce Integer Programming
- To Solve Network problems & Non-linear programming

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 principles and practices of computing grounded in mathematics and science	K1
CO2	To understand the Problems using various linear Algorithms	K2
CO3	To apply algorithms to the decision making problems	K3
CO4	To analyze the programming algorithms with exercises	K4
CO5	To Summarize the inventory and queuing models	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	Introduction: Simplex method – Graphical method – Standard form – IBFS- Artificial Variable technique – Big M Method	12
Unit II	Transportation : Mathematical formulation – Initial feasible solution – North – West Corner Method – Matrix minima method – Vogel’s approximation method – Optimized basic feasible solution- Solution by UV method Assignment Problem : Introduction – Definition – Assignment algorithm – Balanced Assignment Problem – Unbalanced Assignment problem – Hungarian Method	11
Unit III	Networks : Networks and basic components – rules – time calculation in networks – CPM – PERT – PERT Calculations- Resource analysis in network scheduling project cost – time cost optimization algorithm	12
Unit IV	Inventory : Introduction – Reasons for carrying Inventory – Type of Inventories – The Inventory decision – EOQ with no Shortages – Production problem with no shortages – EOQ with Shortages – Production problem with shortages- EOQ with Price Breaks – EOQ with no price breaks – EOQ with two price breaks Queuing Theory : Queuing System characteristics – Poisson process and exponential distribution (M/M/1) : (I I /FIFO) , (M/M/1) : (N /FIFO) , (M/M/C) : (I I / FIFO) , (M/M/C) : (N /FIFO)	12
Unit V	Sequencing : Introduction- problems of sequencing – problems with n jobs and two machines – Problems with n jobs and three machines – problems with n jobs and m machines Replacement Theory : Introduction – replacement of equipment or asset the deteriorates gradually – replacement of equipment that fails suddenly	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	KantiSwarup, P.K. Gupta and Man Mohan	Operations Research	Sultan Chand & Sons Educational Publishers, New Delhi.	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	1. P.K. Gupta, D.S. Hira	Problem in Operations Research	S.Chand& Company Ltd.,	2007
2	J.K. Sharma	Operations Research Theory and Applications	Macmillan India Ltd.3 rd Edition,	2006
3	Hamdy A. Taha	Operations Research : An Introduction	PHI, New Delhi,8 th Edition	2008

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. S.Niraimathi	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UAI206			Title	Batch:	2022 - 2025	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	Core Lab II Programming Lab in Python	Semester:	II	
					Credits:	2	

Course Objective

To give a basic introduction to object-oriented and to demonstrate the concepts of Artificial Intelligence and Data science, using Python

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the principles of structured programming Recognize and construct common programming idioms: variables, loop, branch, subroutine, and input/output.	K3
CO2	To understand the common programming idioms: variables, loop, branch, subroutine, and input/output	K4
CO3	To figure out ability to analyze and solve the problems using advanced facilities of the Python language	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
	1. Program to find the factorial of a number using recursion 2. Program to implement the control structures 3. Program to implement the list 4. Program to implement the operations and methods of the String 5. Program to implement the Tuples 6. Program to implement the Dictionaries 7. Program to import and use the system libraries 8. Program to implement the modules 9. Program to implement the standard modules 10. Program to implement Exceptions and Error handling 11. Program to implement Objects and Class 12. Program to demonstrate File handling 13. Program to demonstrate JSON 14. Program to demonstrate Numpy 15. Program to Demonstrate Pandas
	Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S. Gowrishankar, A. Veena,	Introduction to Python Programming,	CRC Press Taylor and Francis Group, Ist Edition	2018

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E.Balagurusamy	Introduction to Computing and Problem Solving Using Python	McGraw Hill Education1st Edition	2016
2	Wesley J. Chun	Core PythonProgramming	, Pearson Education, 2nd Edition	2009

B.ScComputer Science with AI & ML Effective from the year 2022 onwards

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI207			Title	Batch:	2022 – 2025
				Capstone Project - 1	Semester:	II
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem.			Credits:	2

SEMESTER III

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	22UAI308			Title	Batch:	2022 – 2025	
				Database Systems Concepts	Semester:	III	
Lecture Hrs./Week or Practical rs./Week	5	Tutorial Hrs./Sem.	5		Credits:	4	

Course Objectives

This course has been designed for students to learn and understand

- To the foundations of of database management systems.
- To give a good formal foundation on the relational model of data.
- To use the database management systems in various real-time applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the foundations of database systems.	K2
CO2	Demonstrate the basics of SQL for database	K3
CO3	Execute various advanced SQL queries.	K4
CO4	Apply various normalization techniques on databases.	K4
CO5	Apply and relate the concept of transaction, concurrency control and recovery in database.	K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	H	H	H	M	L	M	L	M	M	H	M
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	Course contents	Hours
Unit I	Introduction :Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design- Object-Based and Semi structured Databases - Data Storage and Querying - Transaction Management – Data Mining and Analysis - Database Architecture - Database Users and Administrators - History of Database Systems. Relational model : Structure of Relational Databases - Fundamental Relational-Algebra Operations - Additional Relational-Algebra Operations - Extended Relational-Algebra Operations - Null Values - Modification of the Database	15
Unit II	SQL : Data Definition - Basic Structure of SQL Queries - Set Operations- Aggregate Functions- Null Values -Nested Subqueries - Complex Queries - Views - Modification of the Database - Joined Relations Advanced SQL : Data Types and Schemas - Integrity Constraints - Authorization – Embedded SQL - Dynamic SQL - Functions and Procedural Constructs- Recursive Queries- Advanced SQL Features	15
Unit III	Database Design and the E-R Model : Overview of the Design Process - The Entity-Relationship Model - Constraints - Entity-Relationship Diagrams Relational Database Design : Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies - More Normal Forms - Database-Design Process - Modeling Temporal Data. NoSQL definition - Relational Vs non-relational database - working with NoSQL - Running MongoDB - Getting A Database Connection - Inserting Data into A Collection - Accessing Data From a Query	15
Unit IV	ORACLE : Introduction – CODD’s Rule – Tools of ORACLE - Introduction to SQL – Benefits of SQL - Data Types – DDL – DML – DCL - TCL - Data Constraints. ORACLE SQL Functions –Single Row Functions: Date, Number, Miscellaneous, Conversions, Character Functions - Group Functions – SQL Operators: Arithmetic, Comparison and Logical Operators – Set Operators – Joins – Sub Queries – Views	15
Unit V	PL/SQL : Introduction–Advantages of PL/SQL – Architecture of PL/SQL – Introduction to PL/SQL Block - Data Types – Control Structures - Concepts of Error Handling – Cursor - Procedure - Functions – Triggers - Types of Triggers.	15

Total	75
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Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ASilberschatz, H Korth,SSudarshan	Data base System and Concepts", (5th Edn.)	TMH.	2005

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sadalage, P. & Fowler,	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence,	Pearson Education.	2005
2	Alexix Leon & MathewsLeon	"Essential of DBMS"	(2ndEdn.),Vijay NicolePublications	2009
3	Alexix Leon & Mathews Leon	"Fundamentals of DBMS"	2ndEdn.),Vijay NicolePublications	2014
4	Redmond, E. &Wilson	Seven Databases in Seven Weeks	Pragmatic Bookshelf	2018

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.B.Azhagusundari	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI309			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	5	Introduction to AI	Semester:	III
					Credits:	4

Course Objectives

To introduce the basic concepts of artificial intelligence and techniques of Machine Learning.

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 principles and practices of Typical AI Problems	K1
CO2	To understand problem solving using search strategies and Game playing	K2
CO3	To Choose the suitable machine learning methods/algorithms for various type of learning problems	K3
CO4	To Analyse the Knowledge representation techniques	K4
CO5	To Apply appropriate Linear models to different contexts	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	M
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

Unit	Contents	Hours
I	INTRODUCTION TO AI: Introduction–Definition – History of AI - Future of Artificial Intelligence – Intelligent Agents: Agents & Environments-The Concept of Rationality – The Nature of Environments - PEAS representation for an Agent–The structure of Agents - Problem Solving Approach to Typical AI problems	15
II	PROBLEM SOLVING: Solving problems by Searching – Problem solving Agents- Example Problems –Searching for Solutions – Uninformed Search Strategies–Informed (Heuristics) Search Strategies – Local Search Algorithms and Optimization Problems -Searching with Partial Observations	15
III	ADVERSARIAL SEARCH: Games - Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games - Partially observable games CONSTRAINT SATISFACTION PROBLEMS: Defining Constraint Propagation problems – inference in CSP's - Backtracking Search for CSP's – Local search for CSP's- The Structure of Problems	15
IV	LOGICAL AGENTS: Knowledge Based Agents - Propositional Logic – Propositional Theorem proving- Propositional model Checking - Agents based on propositional logic - FIRST ORDER LOGIC: Syntax and Semantics of First Order Logic – Using First Order Logic-Knowledge Engineering in First Order Logic–Inferences in first-order logic - Unification – Forward Chaining-Backward Chaining – Resolution	15
V	AI Applications : Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition	15
Total		75

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
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1	Deepak Khemani	“Artificial Intelligence”	Tata McGraw Hill Education	2013
2	Stuart Russel and Peter Norvig	“Artificial Intelligence – A modern approach”,(2nd Edn.)	Prentice Hall	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Prachi Joshi, and Parag Kulkarni	Artificial Intelligence: Building Intelligent Systems”, (2nd Edn.),	MIT Press	2012
2	Elaine Rich, Kevin Knight and Shiva shankar B Nair	“Artificial Intelligence”	TMH	2010

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI3A1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	5	General Elective 3: Discrete Structures and its Applications	Semester:	III
					Credits:	4

Course Objectives

Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.

Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.

Introduce students to prove mathematical statements by means of inductive reasoning

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs	K1
CO2	Demonstrate an understanding of relations ,functions, Combinatorics and lattices	K2
CO3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation	K3
CO4	Analyze and construct mathematical arguments that relate to the study of discrete structures	K4
CO5	Analyze and construct mathematical arguments that relate to the study of discrete structures	K5

Unit	Course contents	Hours
I	Relations: Cartesian product of two sets – Relations – Representation of Relation – Operations on Relations – Equivalence of Relation – Closures and Warshall's Algorithm – Partitions and equivalence classes	15
II	Coding Theory: Introduction – Hamming distance – Encoding a Message – Group codes –Procedure for Generating Group Codes – Decoding and error correction – An example of Simple Error Correcting Code.	15

III	Mathematical Logic: Introduction – True / False - Statements – Connectives – Atomic and Compound Statements – Well Formed (Statement) Formulae – The truth table of a formula – Tautology – Tautological implications and equivalence of a formula – Normal forms – Principal Normal Forms.	15
IV	Graph Theory : Graphs and sub graphs - Operations on Graphs - Isomorphism of Graphs - Walks, paths and cycles - Trees - spanning trees of graph - Algorithm for finding a spanning tree of a connected graph - Krushkal’s algorithm to find an optimal tree of a weighted graph.	15
V	Number Theory: Divisibility: Divisibility of integer – Division algorithm – Common divisor – Greatest common divisor– The Euclidean algorithm – Primes and Composite Number: Definition of Prime, Composite, Twin prime – Euclid’s theorem – Unique factorization theorem – To find GCD & LCM of two integers – Positional representation of on integers – Worked examples	15
Total		75

Text Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Dr.M.K.Venkataraman, Dr.N.Sridharan, N. Chandarasekaran (Unit – I, II, III)	“Discrete Mathematics”	The National Publishing Company, Chennai	2006
2	S.Kumaravelu& SusheelaKumaravelu (Unit – IV)	“Graph Theory”	JankiCalender Corporation, Sivakasi	1999
3	S.Kumaravelu& SusheelaKumaravelu (Unit – V)	“Elements of Number Theory”	Raja Sankar offset Printers, Sivakasi	2002

Reference Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.P.Tremblay, R Manohar	“Discrete Mathematical Structures with Applications to Computer Science”	Tata McGraw Hill Education	2007
2	Narsingh Deo	Graph Theory with applications to engineering and computer science	Prentice hall of India, New Delhi	2003

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: Mr S. Earnest Rajadurai	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI310			Title	Batch:	
				Title Core Lab III : DBMS Lab	Semester:	III
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5		Credits:	2

Course Objective

To make the students to work with relational, Structured and unstructured Databases like SQL, NoSQL and Mongo DB

Course Outcomes

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

CO1	To remember the principles of relational databases.	K3
CO2	To understand the common constructs of relational databases to formulate queries	K4
CO3	To figure out ability to analyze and solve the problems using advanced facilities of SQL	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

Contents

To implement the DDL Commands.
 Implementation of the DDL Commands with Key Constraints.
 To Implement the DML Commands.
 Implementation of DCL Commands and Views.
 Write a PL/SQL program to check whether a number is even or odd.
 Design a PL/SQL block of code for reversing a number..
 Design a PL/SQL block to calculate the incentive of an employee.
 Write a PL/SQL program to check whether a given number is positive, negative or zero.
 Write a PL/SQL program using FOR loop to insert ten rows into a database table.
 Write a PL/SQL program to check whether a given character is letter or digit.

60 Hrs

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.B.Azhagusundari	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI311			Title	Batch:	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Title	Semester:	III
				Core Lab IV : AI Lab	Credits:	2

Course Objective

To make the students to work with relational AI Concepts

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the Typical AI problems	K3
CO2	To Analyze the search strategies	K4
CO3	To implement the Typical problems in AI	K5

	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

Content
Write a Python Program to implement the Breadth first Search Traversal. Write a Python Program to implement the Hangman game. Write a Python Program to sort the sentence in the alphabetical order. Write a Python Program to implement Tic-Tac –Toe game. Write a Python Program to implement the Water jug Problem. Write a Python Program to Find factorial of the given number to implement the simple chat bot. Implement A* algorithm for the following problems: i) 8 puzzle ii) Missionaries and Cannibals. Implement and test hill climbing based search algorithms to solve Travelling Salesman Problem. Solve and implement map coloring problem by backtracking and constraint propagation Solve and implement towers of Hanoi problem by planning.
60 Hrs

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.S.Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc		Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI3N1		Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.	Non-Major Elective Paper-I : Internet Concepts	Semester:	III
				Credits:	2

Course Objectives

To give the confidence for the students to build a customized Web Page

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To Understand the basic internet concepts	K3
CO2	To analyze the Tags required to build a webpage and using the CSS	K4
CO3	To implement the Web Pages	K5

	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

Contents	
Internet concepts	
1. Write a HTML Program for Text Formatting	
2. Write a HTML Program to display your education details in a tabular format	
3. Write a HTML Program to illustrate the usage of the following: a) Ordered List	
b) Unordered List Definition List	
4. Write a HTML code to create a Home page having three links: About Us, Our Services and	
Contact Us. Create separate web pages for the three links.	
5. Write a HTML Program to create a login form. On submitting the form, the user should get	
navigated to a profile page	
6. Write a HTML Program to demonstrate the Anchor Tag	
7. Write a HTML Program to demonstrate inline image	
8. Write a program to demonstrate inline CSS	
9. Write a HTML program to demonstrate the usage of external CSS	
10. Write a HTML program to demonstrate the embedding of sound and video files	
Total	15

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc		Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI3N2		Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.	Non-Major Elective Paper-I : Data Processing Through Excel Lab	Semester:	III
				Credits:	2

Course Objectives

To ease the data processing operations by using Excel

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To understand the basics of Excel	K3
CO2	To analyze the use of Excel in Data Processing	K4
CO3	To implement the Data Processing concepts in Excel	K5

	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

Contents
1. Enter the following data and save it in grade .xls Name Marks1 Marks2 Marks3 Total Percentage Grade Amit 80 70 80 Renu 70 60 90 Rajeev 60 50 80 Manish 50 30 90 Sanjeev 40 40 80 Anita 70 70 90 Do the following (a) Compute the total marks and percentage of each student by entering appropriate formula. (b) Draw a border around the worksheet (c) Change the font size of heading to 14 points and underline it and hide column c (d) Increase the width of column A to 15 characters (e) Right Align the values in column B, C, F

2. Create a sheet containing Nation-wide sales results for Avon Helmets-Region, Vendor name,Helmet type, Helmet Color and Total sales. a. Sort the data by Region, Vendor name and sales. b. Sort the data according to a custom list of Helmet Color - Red, Blue, Yellow and Green. 3. Create a sheet containing Nation-wide sales results for Avon Helmets- Region, Vendor name Helmet type, Helmet Color and total sales. a. Use Filtering on Region and Helmet type. b. Use subtotal function to count the number of records and sum of sales for the filtered records. 4. Use Query Wizard to filter East, West Region transaction and sort them on Region and Total sales. 5. Perform the following a. Create a list of vendor and total sales by consolidating the total sales. b. Compute sub totals with no detail data. c. Create Subtotals by both Region and Vendor within Region. 6. Create a PIVOT TABLE to show the sales results by Region and Helmet type and summarize the total sales. 7. Create a PIVOT chart for the pivot table of total sales for the Region and Helmet types. 8. Create a bar chart to show the sales results for different Helmet type and to the following formats. a. Add a Secondary axis. b. Create picture markers.	
Total	15

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

SEMESTER IV

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI412			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		Cloud Computing	Semester:	III
					Credits:	4

Course Objectives

To understand the concepts in Cloud Computing and its Security
 To understand the evolving computer model, cloud computing.
 To introduce the various levels of services that can be achieved by cloud.

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 of Cloud computing	K1
CO2	To understand levels of services of Cloud	K2
CO3	To explain and apply Concepts of Cloud	K3
CO4	To Analyze the security aspects in the cloud	K4
CO5	To Apply appropriate Linear models to different contexts	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	M
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

Unit	Contents	Hours
I	Cloud Computing Foundation: Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing	12

II	Cloud Computing Architecture : Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization : Foundation – Grid, Cloud and Virtualization – Virtualization and Cloud Computing	12
III	Data Storage and Cloud Computing : Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services : Cloud Services – Cloud Computing at Work	12
IV	Cloud Computing and Security : Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools : Tools and Technologies for Cloud – Cloud Mashups – Apache Hadoop – Cloud Tools	12
V	Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications	12
Total		60

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	A.Srinivasan and J.Suresh	Cloud Computing – A Practical Approach for Learning and Implementation	Pearson India Publications	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	RajkumarBuyya, James Broberg, Andrzej	Cloud Computing: Principles and Paradigms	Wiley India Publications	2011
2	ArshdeepBahga and Vijay Madiseti	Cloud Computing – A Hands on Approach	Universities Press (India) Pvt Ltd	2014

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI413			Title	Batch:	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	Title: Core Introduction to Machine Learning	Semester:	IV
					Credits:	5

Course Objective

- To understand basic concepts of machine learning
- Understand how to evaluate models generated from data
- Discover how to build machine learning algorithms, prepare data, and use different techniques using Python

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the concept of Machine learning techniques and mathematical concepts in ML	K1
CO2	Understand a wide variety of learning algorithms.	K2
CO3	Understand how to evaluate models generated from data	K3
CO4	Provide a way to evaluate performance of machine learning algorithms.	K3
CO5	Apply the algorithms to a real-world problem and optimize the models learned.	K4

Mapping

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

Unit	Course contents	Hours
I	Introduction: Machine Learning Foundations – Overview – Design of a Learning System – Types of Machine Learning –Supervised Learning and Unsupervised Learning – Applications of Machine Learning - Overview of Tools for ML.	12
II	Supervised Learning – I: Simple Linear Regression – Multiple Linear Regression – Polynomial Regression – Ridge Regression – Lasso Regression – Evaluating Regression Models – Model Selection – Bagging – Ensemble Methods.	12
III	Supervised Learning – II: Classification – Logistic Regression – Decision Tree Regression and Classification – Random Forest Regression and Classification – Support Vector Machine Regression and Classification - Evaluating Classification Models.	12
IV	Unsupervised Learning: Clustering – K-Means Clustering – Density-Based Clustering – Dimensionality Reduction – Collaborative Filtering.	12
V	Association Rule Learning: Association Rule Learning – Concepts related to ARL – ARL Algorithms - Apriori – Eclat – Concepts and Algorithms..	12
Total		60

TEXT BOOK:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Kevin P. Murphy	Machine Learning: A Probabilistic Perspective	MIT Press	2012

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	EthemAlpaydin,	Introduction to Machine Learning	MIT Press, Third Edition	2014
2	Tom Mitchell	Machine Learning	McGraw-Hill, 1997	1997
3	Sebastian Raschka, VahidMirjilili	Python Machine Learning and deep learning”,	kindle book,2nd edition	2018
4	Carol Quadros	Machine Learning with Python, Scikit-learnand Tensorflow”,	Packet Publishing,	2018

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI4A1			Title	Batch:	
				Title: General Elective 4: Mathematics for ML	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5		Credits:	4

Course Objective

This course provides basics for understanding concept of statistics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To remember the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	K1
CO2	Understanding of the strengths and weaknesses of many popular machine learning approaches.	K2
CO3	Understand the concepts of computational learning theory and Sample data	K3
CO4	Appreciate the underlying the concept of NFA	K4
CO5	Apply the algorithms to a real-world problem, optimize the models learned.	K5

Mapping

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

Unit	Course Contents	Hours
I	Introduction – Population – Sample – Parameter and Statistic - Sampling distribution - Null hypothesis – alternate hypothesis – Type I & II errors – Size of Type I & Type II errors – Critical region - One tail and Two tail test – Large Sample tests for : Specified Mean, Equality of Population Means, Specified Proportions – Equality of two Proportions – Confidence Interval – definition - Simple Problems	12
II	Small Samples: t – test. Test for Specified mean, Test for equality of Population means - Test for paired observations – Chi – Square Test: Test for significance of difference between observed and expected frequencies – Test for independence of attributes – 2 X 2, 2 X 3 and 3 X 2 contingency table - Simple Problems.	12
III	Analysis of Variance: Definition – One way classification –Two way classification - related problems.	12
IV	Finite Automata: Definition – Representation of a Finite Automaton – Acceptability of a string by a Finite Automaton – Language accepted by a Finite Automaton – Nondeterministic Finite Automata – Acceptability of a string by NFA – Procedure for finding an FA equivalent to a given NFA - Problems	12
V	Phrase – Structure Grammars – Derivations in a grammar G – Chomsky Hierarchy of Languages – Finite Automata and Regular Languages – Derivation trees for context free Grammars – Normal Forms for Context free Grammars – Worked examples	12
Total		60

Text Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	P.R. Vittal,	Mathematical Statistics	Margham Publications, Chennai	2015
2	Dr.M.K.Venkataraman, Dr.N.Sridharan and N.Chandrasekaran,	Discrete Mathematics	Th National Publishing Company, Chennai	2006

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
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1	S.P.Gupta	Statistical Methods	Sultan Chand & Sons, New Delhi, 44th Revised Edition	2014
2	Gupta, S.C. and Kapoor V.K	Fundamentals of Mathematical Statistics	S. Chand & Sons	2016
3	R.S.Bharadwaj	Business Statistics	Excel Book	2006
4	Dr.N.Murugesan,	Principles of Automata Theory and Computation	Sahithi Publication, Coimbatore, First Edition	2004

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI414			Title	Batch:	
				Title	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	5	MACHINE LEARNING LAB	Credits:	2

Course Objective

To focus on the Machine learning Techniques.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts and techniques of Machine Learning.	K3
CO2	Explain the regression methods, classification methods, clustering methods.	K4
CO3	Demonstrate Dimensionality reduction Techniques	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

Content

1. Write a program to implement the Simple and Multiple Linear Regression
2. Write a program to implement the Polynomial Regression
3. Write a program to implement the Bagging Technique
4. Write a program to implement the Adaboost Methods
5. Write a program to implement Logistic Regression algorithm
6. Write a program to demonstrate the workflow of Decision Tree Classification
7. Write a program to implement the Random Forest Classification
8. Write a program to implement the SVM Classification
9. Write a program to perform the K Means Clustering
10. Write a program to perform the Density based Clustering
11. Write a program to implement the Apriori algorithm for market basket analysis
12. Write a program to compare the Supervised Machine Learning algorithms.

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	22UAI415			Title	Batch:	
				Title	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.		Capstone Project II	Credits:	2

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	23UAI205			Title	Batch:	2022 - 2025	
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.		Block chain Technology	Semester:	IV	
					Credits:	2	

Course Objectives

To introduce the basic concepts of artificial intelligence and techniques of Machine Learning.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of Blockchain technology.	K1
CO2	Identify the working of blockchain	K2
CO3	Describe the Technology Stack for Blockchain	K3
CO4	Discuss the Network component of Block Chain	K4
CO5	Analyse and implement the use cases of Blockchain	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	M
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

Unit	contents	Hours
I	Introduction to Blockchain Technology - History of Blockchain - Features of Blockchain - Important Blockchain Terminologies - Different Versions of Blockchain - Types of Blockchain - Public Blockchain - Private Blockchain - Hybrid Blockchain - Consortium Blockchain - Applications of Blockchain - Advantages and Disadvantages of Blockchain - Benefits of Blockchain Technology	6
II	Working of a Blockchain Work - Need of Blockchain - Peer-to-Peer Network – Decentralization of Block Chain - Ledger- Blockchain Distributed Ledger - Difference between Centralized and Distributed Ledgers - Difference between Public and Private Ledgers	6
III	Blockchain Architecture - Blockchain Structure - Genesis Block in Blockchain - Candidate Block in Blockchain - Actors Involved in Blockchain Solution - Blockchain Transaction Life-cycle - Blockchain Forks - Blockchain and Block Header	6
IV	Components of Blockchain Network - Blockchain Incentives to Miners - Core Component of Blockchain - Blockchain Protocols and their Working - Resolving Conflicts in Blockchain -Blockchain Authentication	6
V	Blockchain and Cryptocurrency - BlockchainCryptocurrency – Benefits of Cryptocurrencies – Blockchain–Electronic Cash - Blockchain Wallet – Features - Working of Blockchain Wallet - Blockchain Applications - Top Applications of Blockchain in the Real World - Integration of Artificial Intelligence and BlockChain - Use Cases of BlockChain in different fields	6
Total		30

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	Daniel Drescher	“Blockchain Basics: A Non-Technical Introduction in 25 Steps”	APress	2017

2	Dr. Beaulah David, Dr. H Shaheen&Dr. George Fernandez I	“Blockchain Technology Handbook”	Notion Press	2022
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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Parikshit Jain	A Practical Guide To Blockchain And Its Applications	Bloomsbury India, 1st Edition	2019
2	Kumar Saurabh&AshutoshSaxena	Blockchain Technology Concepts And Applications	Wiley	2020

Online Resources/Web references

<https://www.geeksforgeeks.org/blockchain>

<https://www.javatpoint.com/blockchain-tutorial>

<https://www.simplilearn.com/tutorials/blockchain-tutorial>

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Name: Dr. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI4N1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.		Non-Major Elective Paper-II : Web Technology Lab	Semester:	IV
					Credits:	2

Course Objectives

The objectives of this course are to have a practical understanding about how to write PHP code to solve problems.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge and develop application programs using PHP	K3
CO2	Create dynamic Web applications such as content management, user registration, and e-commerce using PHP and to understand the ability to post and publish a PHP website.	K4
CO3	Develop a MySQL database and establish connectivity using MySQL.	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

Content	
1. Write a PHP program which adds up columns and rows of given table 2. Write a PHP program to compute the sum of first n given prime numbers 3. Write a PHP program to find valid an email address 4. Write a PHP program to convert a number written in words to digit. 5. Write a PHP script to delay the program execution for the given number of seconds. 6. Write a PHP script, which changes the colour of the first character of a word 7. Write a PHP program to find multiplication table of a number. 8. Write a PHP program to calculate Factorial of a number. 9. Write a PHP script to read a file, reverse its contents, and write the result back to a new file 10. Write a PHP script to look through the current directory and rename all the files with extension .txt to extension .txt. 11. Write a PHP script to read the current directory and return a file list sorted by last modification time. (using filemtime()) 12. Write a PHP code to create a student mark sheet table. Insert, delete and modify records.	
Total	15

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	22UAI4N1			Title	Batch:	2022 - 2025
Lecture Hrs./Week or Practical Hrs./Week	1	Tutorial Hrs./Sem.		Non-Major Elective Paper-II : Web Application Using Photoshop	Semester:	IV
					Credits:	2

Course Objectives

The objectives of this course are to have a practical understanding about how to build web Application using Photoshop

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge and develop Web Application using Photoshop	K3
CO2	Create dynamic Web applications using Photoshop	K4
CO3	Develop a Web page and build hybrid web application employing Photoshop	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

Content	
1. Working with the clone stamp tool 2. Drawing Watch using custom shapes 3. Testing lab mode 4. Using multichannel mode 5. Using the sponge Tool 6. Antique framing 7. Creating a supernova 8. Adding an arrowhead. 9. Isolating a Complex Image 10. Removing an element from an image 11. Captain kirk myopia effect 12. Adjusting the focus 13. Creating an edge mask 14. Applying Transformations 15. Correcting brightness and contrast.	
Total	15

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. S. Niraimathi	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Dr. R .ManicaChezian
Signature	Signature	Signature	Signature

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

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	1.1 Introduction	
	1.2 Objective of the Project	
	1.3 Company Profile	
	1.4 System Specification	
	1.4.1 Hardware Specification	
	1.4.2 Software Specification	
2	System Study	
	2.1 Existing System	
	2.1.2 Drawbacks	
	2.2 Proposed System	
	2.3 Planning and Scheduling	
3	System Design	
	3.2 Overview of the Project	
	3.1 Modules of the Project	
	3.2 Input Design Format	
	3.3 Output Design	
	3.4 Table Design	
	3.5 Supporting Diagrams (ER/DFD/Use Case)	
4	Implementation and Testing	
	4.1 Coding Methods	
	4.2 Testing Approach	
	4.3 Implementation and Maintenance	
5	Project Evaluation	
	5.1 Project Outcome	
	5.2 Limitation of the Project	
	5.3 Further Scope of the Project	
6	Conclusion	
7	Appendix	
	7.1 Source Code	
	7.2 Screenshots and Reports	
8	References	

Size of the Project

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



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