

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 2024-2027

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.

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 adapt better to the changing global scenario and gain access to multiple career opportunities.
- To motivate the budding professionals in exploiting the potential of start-ups and innovations in Artificial Intelligence & Machine Learning and the related Domains and to maintain level of excellence and standards that offers them statewide, national and international significance.

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 judgment 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 programme, the students are expected to	
PSO1	Professional Proficiency: Exhibit good domain knowledge and completes the assigned responsibilities effectively and efficiently on par with the expected quality standards for Artificial Intelligence and Machine Learning professional.
PSO2	Societal and Environmental Sustainability: 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 of PEOs with POs & PSOs

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 IN THE ACADEMIC YEAR 2024)

III to VI SEMESTERS

SCHEME OF EXAMINATIONS

SEMESTER – III										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	24UTL3C3	Tamil Paper-III	3	-	-	3	25	75	100	3
	24UHN3C3	Hindi Paper-III								
	24UFR3C3	French Paper-III								
II	24UEN3C3	Communication Skills – III (Level I) /Communication Skills – III (Level II)	3	-	-	3	25	75	100	3
III	24UAI307	CC V: Python Programming	4	-	-	3	25	75	100	4
	24UAI308	CC VI: Artificial Intelligence	4	-	-	3	25	75	100	4
	24UAI3A1/2 4UAI3A2	GE III – Allied III: Discrete Structures and its Applications / Numerical Techniques	5	-	-	3	25	75	100	4
	24UAI309	CC Lab III: Python Programming Lab	-	4	-	3	20	30	50	2
	24UAI310	CC Lab IV: AI Lab	-	4	-	3	20	30	50	2
IV	24UAI3N1 / 24UAI3N2	Non Major Elective - I : Web Development Essentials / Data Processing using Excel Lab(SEC)	-	2	-	2	-	50	50	2
	24HEC303	Human Excellence - Professional Values & Ethics - SKY Yoga Practice - III	1	-	-	2	20	30	50	1
V		Extension Activities (NSS,NCC,Sports& Games, etc.,)	-	-	-	-	-	-	-	-
EC	24CMM302	ManaiyiyalMahathuvam-II			15 Hrs.	2	-	50	50	Grade
	24CUB302	UzhavuBharatham– II			15 Hrs.	2	-	50	50	Grade
		OnlineCourse(Optional)(MOOC/NPTEL/SWAYAM)								
Total			30						700	25

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

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

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

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

SEMESTER – IV										
Part	Subject Code	Title of the Paper	Hrs. / Week		Hrs. / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P	T		Internal	External		
I	24UTL4C4	Tamil Paper-IV	3	-	-	3	25	75	100	3
	24UHN4C4	Hindi Paper-IV								
	24UFR4C4	French Paper-IV								
II	24UEN4C4	Communication Skills – IV (Level I) / (Level II)	3	-	-	3	25	75	100	3
III	24UAI411	CC VII: Machine Learning Techniques	4	-	-	3	25	75	100	3
	24UAI412	CC VIII: DataBase System Concepts	4	-	-	3	25	75	100	3
	24UAI4A1/ 24UAI4A2	GE IV – Allied IV: Fundamentals of Computer Networks	4	-	-	3	25	75	100	3
	24UAI413	CC Lab V: ML Lab	-	4	-	3	20	30	50	2
	24UAI414	CC Lab VI: DBMS Lab	-	3	-	3	20	30	50	2
	24UAI4S1/ 24UAI4S2	SEC II: Naan Mudhalvan :Block Chain Technology / Aptitude for Placements	-	2	-	2	-	50	50	2
IV	24UAI4N1 / 24UAI4N2	Non Major Elective - II : Web Application Development / Transforming Data with Excel and Power BI	-	2	-	2	-	50	50	2
	24HEC404	Human Excellence - Social Values & SKY Yoga Practice - IV	1	-	-	2	20	30	50	1
V		Extension Activities (NSS,NCC,Sports& Games, tc.,)	-	-	-	-	-	-	50	1
EC	24CMM403	ManaiyiyalMahathuvam-III			15 Hrs.	2	-	50	50	Grade
	24CUB403	UzhavuBharatham– III			15 Hrs.	2	-	50	50	Grade
	24UAI4VA	VAC-II: Practical approach for Statistical problems using AI and Machine Learning			30 hrs					2*
		OnlineCourse(Optional)(M OOC/NPTEL/SWAYAM)								
Total			30						800	25

SEMESTER V										
Part	Course Code	Course Title	Hrs/ Week		Hrs/ Sem	Exam Hrs	MAX.MARKS			Credits
			L	P			Int	Ext	Total	
III	24UAI517	CC IX: Natural Language Processing	5	-	-	3	25	75	100	4
	24UAI518	CC X: Big data technologies	5	-	-	3	25	75	100	4
	24UAI5E1/ 24UAI5E2/ 24UAI5E3	DSE-I: / IoT Soft Computing/ Mobile Application Development	5	-	-	3	25	75	100	5
	24UAI519	CC Lab VI: Programming Lab in NLP	-	5	-	3	20	30	50	2
	24UAI520	CC Lab VII : Big Data Technologies Lab	-	5	-	3	20	30	50	2
IV	24UAI5S1/ 24UAI5S2 / 24UAI5S3	SEC-III :AI for Cyber Security / Design Thinking/ Human Computer Interaction	-	4	-	3	-	50	50	2
	24HEC505	Human Excellence Paper: National Values& SKY Yoga Practice-5	1	-	-	2	20	30	50	1
EC	24UAI5AL	ALC I : Business Intelligence	SS		-	-	-	100	100	2**
	24AID501	Soft Skills Development – I	-		-	-	-	-	-	Grade
	24GKL501	General Knowledge	SS		-	2	-	50	50	Grade
Total			30						500	20

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

DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course ALC-Advanced Learner Course (Optional)

*Extra Credits;**Credits – Based on course content maximum of 4 credits

	SEMESTER VI									
Part	Course code	Course Title	Hrs/Week		Hrs/Sem	ExamHrs	MAX.MARKS			Credits
			T	P			Int	Ext	Total	
III	24UAI621	CCXI :Deep Learning	5	-	-	3	25	75	100	4
	24UAI6E4 24UAI6E5 24UAI6E6	DSE-II: UI/UX Design/Gen AI/Text analytics	4	-	-	3	25	75	100	4
	24UAI6E7 24UAI6E8 24UAI6E9	DSE-III : AR/VR/ Open Source Technologies in AI/ Robotics& its Applications	5	-	-	3	25	75	100	4
	24UAI622	CC LabIX: Deep Learning Lab	-	6	-	3	20	30	50	2
	24UAI623	CC LabX: Power BI Data Visualization Lab	-	5	-	3	20	30	50	2
	24UAI624	Project	-	-	-	-	25	75	100	3
IV	24UAI6S4/ 24UAI6S5/ 24UAI6S6	SEC IV: Social & Ethical Issues in AI/ Computer Vision/Recommender Systems	3	-	-	2	12	38	50	2
	24HEC606	Human Excellence Paper: Global Values& SKYYogaPractice-6	1	-	-	2	20	30	50	1
EC	24AID602	Soft Skills Development-II	-		-	-	-	-	-	Grade
	24UAI6AL	ALC-II :Quantum Computing	SS		-	-	-	100	100	2*
Total			30				600			22
Grand Total									3900	140

EC – Extra Credit Course / Certificate Course / Co-scholastic Course / Job Oriented Course CC – Core Course;
DSE – Discipline-Specific Elective; SEC – Skill Enhancement Course ALC-Advanced Learner Course (Optional)

*Extra Credits;**Credits – Based on course content maximum of 4 credits

List of Abbreviations:

CC – Core Course

GE – Generic Elective

AECC –Ability Enhancement Compulsory Course

SEC – Skill Enhancement Course

DSE – Discipline-Specific Elective

VAC –Value Added Course

ALC – Advanced Learner Course

Grand Total = 3900; Total Credits = 140

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.
	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	Uses graphics that explain and reinforce text and	Uses graphics that explain the text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation

ICT Tools	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	Sources are	Some sources	Sources are not	Sources are not at

	cited and are used critically	cited and some are used critically	are missing	cited	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:	24UAI101			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem	75	Core I: Problem solving and Programming in C	Semester:	1
					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 Character Strings-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 members Structure 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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI102			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	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 AVijayalakshmiPai	Data structures and Algorithms	McGraw Hill, 1 st Edition, ISBN: 9780070667266	2008
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 Signature	Name: Dr.S.Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B. Sc,			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI1A1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Allied I :	Semester:	I
				Introduction to Linear Algebra	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	Linear Equations: Introduction – system of homogeneous linear equations – augmented matrix – row echelon form - finding the solution of homogeneous system ($AX=0$) - System of non-homogeneous linear equations-working rule for finding the solutions for $AX=B$ - linear independent and dependent - Simple problems.	12
Unit II	Matrices and their algebra: Introduction – matrix – types of matrices – matrix addition and multiplication – partitioning matrices – simple problems. Operation on matrices: Transpose of a matrix – symmetric and skew - symmetric – conjugate – conjugate transpose – Hermitian and skew-Hermitian – orthogonal – unitary matrices – simple problems.	11
Unit III	System of simultaneous linear equations: Introduction – determinants – determinant of a square matrix – singular and non-singular matrices – minors and co-factors – ad-joint of a matrix – invertible matrices – inverse of a matrix – Cramer's rule – theorems (statements only) –rank of a matrix – simple problems.	13
Unit IV	The characteristic equation of a matrix: Introduction – polynomial of a square matrix - characteristic equation of a matrix - characteristic vector of a matrix – Cayley's Hamilton theorem – some results on characteristic roots and vectors – simple problems.	11
Unit V	Vector spaces: Introduction – vector spaces – subspaces – subspace spanned by a set of vectors – basis and dimension of a vector space – standard basis – some results in basis and dimension of a vector space – linear transformation – non-singular linear transformation – inner product – orthogonal – orthonormal - simple problems.	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.S Aggarwal and Matharu	Linear Algebra,	S. Chand and Company Ltd	1999

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gilbert Strang	Introduction to Linear Algebra,	Wellesley – Cambridge Press, 5th Edition.	2016
2	Gilbert Strang	Linear Algebra and Its Applications.	Cengage Learning Fourth Edition.	2006
3	David C. Lay, Steven R. Lay, and Judi J. McDonald	Linear Algebra and Its Applications.	Pearson – 5th Edition.	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
Name: Mr S.Earnest Rajadurai	Name: Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI2A2			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	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 & Susheela Kumaravelu	Graph Theory	Janki Calender Corporation, Sivakasi,	1999
3	Kumaravelu and Suseela Kumaravelu	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.EarnestRajadurai	Name;Dr.S. Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI103			Title	Batch:	2024 – 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab I : Programming in C lab	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 60

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

SEMESTER II

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI204			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core III: Java Programming	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.NageswaraRao	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
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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

Web references

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

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

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

<https://www.programiz.com/java-programming>

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI205			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	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	OPERATING SYSTEMS OVERVIEW: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems. OPERATING SYSTEMS STRUCTURES: Operating system services and systems calls, system programs, operating system structure, operating systems generations.	12
II	PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows. CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.	12
III	DEADLOCKS: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm. MEMORY MANAGEMENT: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.	12
IV	FILE SYSTEM: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.	12
V	I/O SYSTEM: Mass storage structure - overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure. I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.	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	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Operating System Principles	7th edition, Wiley India Private Limited, New Delhi.	2006

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

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI2A1			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	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.	15
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	15
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.	16
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.	14
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.	15
	Total Hours	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	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	Suddhebdubiswas and G.L. Sriwastav.	“Mathematical Statistics”,	1st Edition, Narosa Publishing House Pvt. India.	2009
3	Nababdu Pal and SahadebSarkar	”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.EarnestRajadurai	Name: Dr.S.Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI2A2			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	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 Analyze 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	15
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	16
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	14
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)	16
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	14
	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.EarnestRajadurai	Name:Dr. S. Niraimathi	Name: Mr. K. Srinivasan	Name: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI206			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab II Java Programming Lab	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.NageswaraRao	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:	24UAI2S1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	SEC I: Naan Mudhalvan : Industry 4.0	Semester:	II
					Credits:	2

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/106/105/1061051 95/	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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI2S2			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	SEC-I: Naan Mudhalvan: WEB TECHNOLOGY Lab	Semester:	II
					Credits:	2

Course Objective

- Design web pages using JavaScript.
- Create Dynamic Web pages using JavaScript .

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain knowledge and develop programs using JavaScript	K3
CO2	Create dynamic Web applications using JavaScript	K4
CO3	Implement applications in inline and external JavaScript	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 JavaScript program to generate the Factorial of a given number 2. Write a JavaScript program to generate the Fib Series 3. Write a JavaScript program to Sort the numerical array

4. Write a JavaScript program to Sort the String array
5. Write a JavaScript program to Validate user name and password
6. Write a JavaScript program to Validating user's mail id
7. Write a JavaScript program to calculate the week number by entering a date using html form
8. Write a JavaScript program to Create objects in a form
9. Write a JavaScript program to update the attributes of an object in form
10. Write a JavaScript program to demonstrate the linear graph from statistical library in machine learning
11. Write a JavaScript program to demonstrate the Slope from statistical library in machine learning
12. Write a JavaScript program to demonstrate the Intercept from statistical library in machine learning

Total Hours 30

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 III

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI307			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core V: Python Programming	Semester:	III	
					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 functions to navigate the file system.	K3
CO4	Illustration of Object-oriented Programming concepts in 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, 1st 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 Education 1st Edition	2016
2	Wesley J. Chun	Core Python Programming	, Pearson Education, 2nd Edition	2009

Web References

<https://www.python.org/about/gettingstarted/>

<https://www.geeksforgeeks.org/python-programming-language-tutorial/>

<https://www.programiz.com/python-programming>

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI308			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	CC VI : Artificial Intelligence	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	12
II	PROBLEM SOLVING: Solving problems by Searching – Problem solving Agents- Example Problems –Searching for Solutions - UninformedSearch Strategies–Informed (Heuristics) Search Strategies – Local Search Algorithms and Optimization Problems -Searching with Partial Observations	12
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	12
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	13
V	AI Applications : Language Models – Information Retrieval – Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition	11
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	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 ParagKulkarni	Artificial Intelligence: Building Intelligent Systems”, (2nd Edn.),	MIT Press	2012
2	Elaine Rich, Kevin Knight and Shiva shankar B Nair	“Artificial Intelligence”	TMH	2010

Web references

<https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/>

<https://www.javatpoint.com/artificial-intelligence-ai>

<https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCEr.pdf>

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B. Sc,			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI3A1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem	75	General Elective III : Discrete Structures and its Applications	Semester:	III
					Credits:	4

Course Objective

- To know the concept of Mathematical logic
- To learn the concept of Relations
- To make the students to learn various functions
- To inculcate the knowledge in graph theory

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of equivalence formulas	K1
CO2	Work with normal forms	K2
CO3	Understand the mathematical tools that are needed to solve optimization problems,	K3
CO4	Model the problems in computer science using graphs and trees	K4
CO5	Work with trees and fundamental circuits	K5

Mapping

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

Units	Content	Hrs
Unit I	Mathematical logic: Introduction – TF Statements – connectives – well formed formulae – Truth table of a formula – Tautology – Tautological implications and Equivalence of formulas – Functionally complete sets of connectives – Duality Law - Normal Forms –Principal Normal forms – Theory of inference – simple problems.. Sections 9.1-9.13	12
Unit II	Relations: Introduction – Cartesian product of two sets – Relations – Representation of a relation – Operations on relations – Equivalence Relation – Closures and Warshall’s algorithm – Partitions and Equivalence Classes – simple problems. Sections: 2.1-2.7	12
Unit III	Functions: Introduction – Functions and operators – one-to-one and onto functions – Special Types of functions – Invertible functions - Composition of functions. Mathematical induction: Introduction Technique of proof – Mathematical induction – simple problems. Sections 3.1-3.5 and 4.1-4.2	12
Unit IV	Graph theory: Introduction- – Finite and Infinite graph – Incidence and degree – Isolated vertex, Pendant vertex and null graph. Paths and Circuits: Isomorphism – Sub graphs –Walks, Paths and Circuits – Connected Graphs, Disconnected Graphs and Components– Euler Graphs – more on Euler Graphs – Hamiltonian graphs and circuits – Travelling salesman problem. Sections 1.1 to 1.5, 2.1,2.2,2.4 to 2.6,2.8 to 2.10	12
Unit V	Graph theory: Trees and fundamental circuits: Trees – Some properties of trees – Pendant vertices in a tree – Distance and Centers in a tree – Rooted and Binary trees – Spanning Trees. Sections 3.1 to 3.5,3.7	12
	Total Contact Hrs	60

(Note: Theorems Statement only)

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 and N. Chandrasekaran	Discrete Mathematics	Hill Edition	Reprint 2007.
2	Narasing Deo	Graph theory with application to engineering and computer science	Prentice-Hall of India Ltd. New Delhi-1.	2016.

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	J.K. Sharma	Discrete Mathematics	Trinity Press 4th Edition	Reprint 2015
2	J.P. Tremblay and R. Manohar	Discrete Mathematical Structures with Applications to Computer Science	Hill Edition	Reprint 2007.

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

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	25UAI3A2			Title	Batch:	2025-2028
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.		Title: General Elective 1: Numerical Techniques	Semester:	III
					Credits:	4

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non-linear differential equations when ordinary analytical methods fail.

Course Outcomes (CO)

On successful completion of this core paper, the students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the need of numerical analysis techniques in the areas of approximation theory, and recall some basic concepts.	K1
CO2	Apply the numerical methods for approximating the solution to problems of algebraic and transcendental equations, simultaneous linear equations.	K3
CO3	Estimating the value of a function for any intermediate value of the independent variable using Newton Forward and Backward interpolation Formula as well compute the derivatives using Newton's forward and backward difference formula and Sterling's formula.	K3
CO4	Solve the ordinary and partial differential equations by using Numerical method techniques like Taylors method, Euler's method, RungeKutta method etc.	K4
CO5	Enrich the knowledge of numerical techniques and getting insight of algorithmic approach.	K4

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

SYLLABUS

Units	Content	Hrs.
Unit I	Simultaneous Linear Algebraic Equations: Iterative Methods - Gauss-Jacobi Method – Gauss-Seidal Method – Comparison of Gauss elimination and Gauss-Seidal Iteration methods (Self study). Chapter 4: Sections: 6, 7.	11
Unit II	Interpolation: Introduction - Linear interpolation - Gregory Newton Forward and Backward interpolation Formula - Equidistant terms with one or more missing values. Chapter 6: Sections: 1 - 5	10
Unit III	Numerical Solution of Ordinary Differential Equations: Solution by Taylor Series - Taylor Series method for higher order differential equations- Chapter 11: Sections: 6, 8,	10
Unit IV	Numerical Solution of Ordinary Differential Equations: Euler's method - Improved Euler's method - Modified Euler method. Chapter 11: 10 - 12.	10
Unit V	Numerical Solution of Ordinary Differential Equations: - RungeKutta method - Second order RungeKutta Method - Higher order RungeKutta methods. Chapter 11: 13 - 15.	11

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Venkataraman M. K, Numerical Methods in Science and Engineering, The National Publishing Company, Madras, 2009.

Book for Reference:

Kandasamy P, Thilagavathy K and Gunavathi K, Numerical Methods, S. Chand company Ltd, 2012.

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI309			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core Lab III Python Programming Lab	Semester:	III
					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 60

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 Education 1st Edition	2016
2	Wesley J. Chun	Core Python Programming	, 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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI310			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Title Core Lab IV : AI Lab	Semester:	III
					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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI3N1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Non-Major Elective Paper-I : Web Development Essentials	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 11. Write a XML program for create a food menu 12. Write a XML program with CSS	
Total	30

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI3N2			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Non-Major Elective Paper-I : Advanced Excel Lab	Semester:	III
					Credits:	2

Course Objectives

To create, edit and format Worksheet, analyze data using advanced features in 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 features of Excel	K4
CO3	To implement the features of 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 <table><tr><th>Name</th><th>Marks1</th><th>Marks2</th><th>Marks3</th><th>Total</th><th>Percentage</th><th>Grade</th></tr><tr><td>Amit</td><td>80</td><td>70</td><td>80</td><td></td><td></td><td></td></tr><tr><td>Renu</td><td>70</td><td>60</td><td>90</td><td></td><td></td><td></td></tr><tr><td>Rajeev</td><td>60</td><td>50</td><td>80</td><td></td><td></td><td></td></tr><tr><td>Manish</td><td>50</td><td>30</td><td>90</td><td></td><td></td><td></td></tr><tr><td>Sanjeev</td><td>40</td><td>40</td><td>80</td><td></td><td></td><td></td></tr><tr><td>Anita</td><td>70</td><td>70</td><td>90</td><td></td><td></td><td></td></tr></table> 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.	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			
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																																														

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	30

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Semester IV

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI411			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Core VII: Machine Learning techniques	Semester:	IV
					Credits:	3

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

	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	Course contents	Hours
I	Introduction: Machine Learning Foundations – Overview – Design of a Learning System – ML-Lifecycle - Types of Machine Learning –Supervised Learning and Unsupervised Learning –Semi Supervised Learning- Reinforcement Learning - Applications of	12

	Machine Learning - Overview of Tools for ML.	
II	Supervised Learning – Working of Supervised Learning – Steps involved in Supervised Learning – Regression Analysis in ML- Supervised Learning – I: Linear Regression - Simple Linear Regression – Multiple Linear Regression – Polynomial Regression – Ridge Regression – LassoRegression -Implementation of Regression algorithms in Python – Evaluating Regression Models – Model Selection – Bagging – Ensemble Methods.	12
III	Supervised Learning – II: Classification – Logistic Regression – implementation of Logistic Regression in Python – K-Nearest Neighbour Decision – Implementation of KNN in Python – Decision tree Classification and Python implementation – Random Forest Classification and Python Implementation – Support Vector Machine - Implementation of SVM using Python– EvaluatingClassification Models.	12
IV	Unsupervised Learning: Working of Unsupervised Learning-Types of Unsupervised Learning algorithms - Clustering – K-Means Clustering – Types of Clustering methods –K-Means Clustering Algorithm and Implementation in Python - Density-Based Clustering – DB Scan Algorithm in Python - Dimensionality Reduction techniques– CollaborativeFiltering.	12
V	Association Rule Learning: Working of Association Rule Learning- Types of AL– Concepts related to ARL – ARL Algorithms – Apriori Algorithm and implementation in Python– Eclat – Concepts and Algorithm.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

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-learnandTensorflow”,	Packet Publishing,	2018

Web References

<https://www.geeksforgeeks.org/machine-learning/>

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

<https://www.kaggle.com/learn/intro-to-machine-learning>

<https://www.mygreatlearning.com/blog/machine-learning-tutorial/>

<https://machinelearningmastery.com/start-here/>

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI412			Title	Batch:	2024 – 2027	
				Core VIII: Database System Concepts	Semester:	III	
Lecture Hrs./Week or Practical rs./Week	4	Tutorial Hrs./Sem.	60		Credits:	3	

Course Objectives

This course has been designed for students to learn and understand

- To the foundations 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	12
Unit II	SQL : Data Definition - Basic Structure of SQL Queries - Set Operations- Aggregate Functions- Null Values -Nested Sub queries - 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	12
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 Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, Relational Vs non-relational database - Documents,collections working with NoSQL -CRUD operations - Running MongoDB – Indexing- Aggregation operations	12
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	11
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.	13

Total	60
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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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI4A1			Title	Batch:	2024-2027
				GE IV – 1Allied IV: Fundamentals of Computer Networks	Semester:	IV
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60		Credits:	3

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	Remember computer network basics, network architecture, and TCP/IP and OSI reference models	K1
CO2	Understand the knowledge about essential protocols and their operations.	K2
CO3	Apply aspects of network security	K3
CO4	Familiarize the different types of protocols	K4
CO5	Evaluate detection and correction of errors in transmission.	K5

Mapping

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

Unit	Course Contents	Hours
I	Introduction: Uses of Computer Network-Network Hardware: LAN-WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI Reference Model– TCP/IP reference Model	12
II	Physical Layer - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. Data-Link Layer: Error Detection and correction–Elementary Data-link Protocols– Sliding Window Protocols.	12
III	Network Layer: Routing algorithms – Congestion Control Algorithms – IPv4 Addresses – IPv6 Addresses. Transport Layer: Elements of Transport Protocols – Internet Transport Protocols: TCP – Quality of Service.	12
IV	Session Layer: Session and Transport Interaction – Synchronization Points– Session Protocol Data Unit. Presentation Layer: Translation– Encryption/Decryption– Authentication– Data Compression	12
V	Application Layer: DNS –E-mail: SMTP, POP– File Transfer Protocol– HTTP – Telnet Protocols. Network Security: Concepts of symmetric and asymmetric key cryptography	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Book(s):

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Andrew S. Tanenbaum	Computer Networks	Tata Mcgraw–Hill Edition	2003, PHI
2	Behrouz A. Forouzan	Data Communication	Tata Mcgraw–Hill Edition	2008

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	AchyutGodbole	Data Communication And Networks	Tata McGraw Hill Edition	2007
2	Uyless Black	Computer Networks Protocols, Standards, and Interfaces	Prentice Hall India, 2nd Edition.	1993

Web References

<https://www.geeksforgeeks.org/basics-computer-networking/>

<https://www.javatpoint.com/computer-network-tutorial>

<https://ncert.nic.in/textbook/pdf/lecs110.pdf>

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI413			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	CC Lab V: MACHINE LEARNING LAB	Semester:	IV
					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 python program to demonstrate the statistical libraries
2. Write a python program to demonstrate the math libraries in machine learning
3. Write a python program to demonstrate simple linear regression
4. Write a python program to demonstrate the linear and polynomial using the machine learning
5. Write a python program to demonstrate logistic regression using machine learning
6. Write a python program to demonstrate k- nearest neighbour algorithm using machine learning
7. Write a python program to demonstrate support vector machine using machine learning
8. Write a python program to demonstrate random forest using machine learning
9. Write a python program to demonstrate the decision tree using machine learning
10. Write a python program to demonstrate the k-means clustering using machine learning

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI414			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	Title Core Lab VI : DBMS Lab	Semester:	IV
					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/ SQLblock 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 data base table. Write a PL/SQL program to check whether a given character is letter or digit. MongoDB programs related to create, update, delete and filter related queries
45 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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI4S1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	SEC II : Naan Mudhalvan Block chain Technology	Semester:	IV
					Credits:	2

Course Objective

To make the students to work with block chain technology

Course Outcome

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

Units	Content	Hrs
Unit 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
Unit 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
Unit 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
Unit 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
Unit 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 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	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
Name and Signature	Name and Signature	Name and Signature	Name and Signature
Dr. S. Niraimathi	Dr. S. Niraimathi	Mr. K. Srinivasan	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B. Sc,			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI4S2			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs/Sem	30	Allied I : Aptitude using Vedic Mathematics	Semester:	IV
					Credits:	2

Course Objective

The objective of this course is to provide learners with a deeper understanding of **aptitude concepts** and enhance problem-solving skills through the application of **Vedic Mathematics techniques**.

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

CO Number	CO Statement	Knowledge Level
CO1	Recall and explain the basic Vedic mathematics sutras and techniques.	K1
CO2	Apply Vedic mathematical methods to solve basic arithmetic and aptitude problems.	K2
CO3	Analyze and break down complex aptitude problems using Vedic techniques to simplify calculations.	K3
CO4	Evaluate and compare different Vedic methods to identify the fastest and most efficient approach for a given problem.	K4
CO5	Create and apply new strategies for solving aptitude problems using advanced Vedic 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	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

SYLLABUS

Units	Content	Hrs
Unit I	Vedic Mathematics: Basic level: miscellaneous simple method- cube roots of perfect squares – square roots of perfect squares. Intermediate level: Base method for multiplication and squaring – digit sum method – simultaneous linear equations. Advance level: Square roots of imperfect squares – cubing numbers- base method of division – practice problems.	6
Unit II	Applications of Vedic Mathematics: Addition and subtraction – digits sums and casting out – check method – multiplication method – squaring and square roots - division - practice problems.	6
Unit III	Quantitative Aptitude: Algebra Equations - Speed and Distance - Time & Work - Profit and Loss – simple interest and compound interest – Geometry - simple problems.	6
Unit IV	Quantitative Aptitude: Percentage - Basic Arithmetic - Ratio and Proportions - Number System - Progression - Mensuration - Trigonometry – simple problems.	6
Unit V	Quantitative Aptitude: Probability - Mean, Median, Mode - Venn Diagram - Odd One Out – Analogy - Series, Coding – Decoding - simple problems.	6
	Total Contact Hrs	30

Note: Theorems Statement Only)

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	Dhaval Bathia	Vedic Mathematics	Jaico publishing company Ltd	2022

2	Anita saria	Fundamentals & Applications of Vedic Mathematics	State council of Educational Research & Training	2014
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Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Rajesh Thakur	The Essentials of Vedic Mathematics	Rupa Publications India Pvt. Ltd.	2013

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI4N1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	Non Major Elective - II Web Application Development	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 JAVASCRIPT	K3
CO2	Create dynamic Web applications such as content management, user registration, and e-commerce using JAVASCRIPT	K4
CO3	Develop a JAVASCRIPT database and establish connectivity using JAVASCRIPT	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	
JavaScript Programs: 1. Factorial 2. Fib series 3. Sorting in a numerical array 4. Sorting in a string array 5. Validating user name and password 6. Validating user's mail id 7. Calculate week number by entering a date using html form- 8. Creating objects and functions 9. Updating the attributes of an object in form 10. Using statistical library in machine learning 11. Form validation 12. External file .JS 13. Object	
Total	30

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI4N2			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem.	30	Non-Major	Semester:	IV
				Elective Paper-II : Transforming Data with Excel and Power BI	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 data visualization using Power BI	K3
CO2	Create dynamic visualization using Power BI	K4
CO3	Develop a Visualization using Power BI with Excel data	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	
Connect to Power BI datasets directly from Excel Import data from Excel spreadsheets into Power BI Desktop Create reports and dashboards Publish entire Excel workbooks to the Power BI Service Data transformation tool is available in both Excel and Power	
Total	30

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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI4VA			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	2	Tutorial Hrs./Sem	30	VAC –IIA Practical approach for Statistical problems using AI and Machine Learning	Semester:	IV
					Credits:	2

Course Objective

The objectives of this course are to have a practical understanding about Statistical technique using python

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basics and core constructs of Python programming	K1
CO2	Express proficiency in the handling of functions, strings, lists, dictionaries, tuples and sets	K2
CO3	Apply the concepts of file system.	K3
CO4	Illustration of Object-oriented Programming concepts in Python	K4
CO5	Realize the power of modules like CSV, NumPy, pandas in developing solutions to problems related to statistics	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 to Descriptive Statistics -Types of Measures -Population and Samples- Outliers -Choosing Python Statistics Libraries Getting Started With Python Statistics Libraries -Calculating Descriptive Statistics	10
Unit II	Measures of Central Tendency -Measures of Variability-Summary of Descriptive Statistics-Measures of Correlation Between Pairs of Data Working With 2D Data -Axes-DataFrames	10
Unit III	Visualizing Data :Box Plots-Histograms-Pie Charts-Bar Charts-X-Y Plots-Heatmaps	10
	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	Jesus Rogel Salazar,	Statistics and Data Visualization with Python	CRC Press	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 Education 1st Edition	2016
2	Wesley J. Chun	Core Python Programming	Pearson Education, 2nd Edition	2009

Web references

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

<https://www.javatpoint.com/library-in-python>

<https://www.geeksforgeeks.org/libraries-in-python/>

<https://www.geeksforgeeks.org/descriptive-statistic/>

https://www.tutorialspoint.com/python_pandas/python_pandas_descriptive_statistics.htm

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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

SEMESTER V

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI517			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC IX: Natural Language Processing	Semester:	V
					Credits:	4

Course Objective

- To be familiar with a breath of concepts and tasks in Natural Language Processing.
- To gain a foundational understanding about the methods and evaluation metrics for various NLP tasks.
- To understand the role of semantics of sentences and pragmatics

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To tag a given text with basic Language features	K1
CO2	Understand the linguistic phenomena and to explore the linguistic features relevant to each NLP task.	K2
CO3	Analyze how to evaluate models generated from data.	K3
CO4	Compare and contrast the use of different statistical approaches for different types of NLP applications	K3
CO5	Design an innovative application using NLP components.	K4

Mapping

PO / PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	L	M	H	M	M	M	M	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	Overview - Origins and challenges of NLP –Phases of NLP - Language and Grammar-Processing Indian Languages-Components of NLP–NLP Pipeline –NLP Libraries – Natural Language Understanding and Generation –NLP Applications-Information Retrieval - Language Modeling: Various Grammar -based Language Models - Statistical Language Model.	15
II	Word Level Analysis - Regular Expressions - Finite-State Automata – Regular Expressions to NFA - Morphological Parsing - Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging, Syntactic Analysis – Concept of Parser – Types of Parsing –Parse Trees- Context free Grammar - Constituency- Parsing - Probabilistic Parsing.	15
III	Semantic Analysis-Meaning Representation-Approaches to Meaning Representation - Lexical Semantics–Elements of Semantic Analysis - Ambiguity- Word Sense Disambiguation – Applications of WSD -Discourse Processing – Building Hierarchical Discourse Structure -cohesion - Reference Resolution - Discourse Coherence and Structure.	15
IV	Natural Language Generation –Working of NLG – Stages of NLG- Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.	15
V	Information extraction–Key components of Information Extraction – IE Techniques - Automatic summarization-Python implementation - Information retrieval and Question answering- Named entity recognition and relation extraction –Steps involves in NER – Python implementation of NER–Python implementation of NER and Relation Extraction - IE using sequence labeling –Python Implementation -Machine translation: Basic issues in MT – Statistical translation – word alignment - phrase-based translation and synchronous grammars – Relationship between Phrase based Translation and Synchronous Grammars-Python implementation	15
Total		75

TEXT BOOK:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	TanveerSiddiqui, U.S. Tiwary,	Natural Language Processing and Information Retrieval	Oxford University Press	2012

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Daniel Jurafsky and James H. Martin	Speech and Language Processing: An Introduction to Natural Language Processing	2e Prentice Hall	2013
2	Christopher Manning and Hinrich Schütze	Foundations of Statistical Natural Language Processing	MIT Press,	2008.
3	James Allen	Natural Language Understanding	Addison Wesley.	1995
4	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

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: : Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI518			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC X :Big Data Technologies	Semester:	V
					Credits:	4

Course Objective

To understand the basics of Big data technology.

To introduce some of the application areas where big data can be applied

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Identify Big Data and its Business Implications.	K1
CO2	List the components of Hadoop and Hadoop Eco-System	K2
CO3	Access and Process Data on Distributed File System	K3
CO4	To apply the concept in the real world problems	K4
CO5	Implementation using R	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 To Big Data: Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools	15
Unit II	Mining Data Streams: Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Real time Analytics Platform (RTAP) Applications	15
Unit III	Advanced Analytics: Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis	15
Unit IV	Hadoop And Frameworks: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.	15
Unit V	Introducing R: Understanding features of R – Getting Started With R- - Functions And Statements - - Data Manipulation And Analysis – Linear And Non-Linear Models, Time Series And Clustering Using R.	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	Maheswari	DataAnalytics	McGraw Hill, 1 st Edition	2017

2	VigneshPrajapathi,	Big Data Analytics with R and Hadoop,	PACKT Publishing,	2013
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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Stephan Kudyba	Big Data, Mining, and Analytics: Components of Strategic Decision Making	Auerbach Publications	2014
2	Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author),	Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses	Wiley Publications, 2	2013
3	Judith Hurwitz, Alan Nurgent, Dr. Fern Halper, Marcia Kaufman,(2013)	Big Data for Dummies	First Edition, AWiley Publication	2013

Web References

<https://www.javatpoint.com/big-data-technologies>

https://www.tutorialspoint.com/big_data_analytics/index.htm

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

<https://www.javatpoint.com/r-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. B.Azhagusundari	Dr. S. Niraimathi	Mr. K. Srinivasan	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI5E1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE-I: IoT	Semester:	V
					Credits:	5

Course Objective

- To understand the basics of Internet of things and protocols.
- To introduce some of the application areas where Internet of Things can be applied.
- To learn the middleware for Internet of Things.
- To understand the concepts of Web of Things

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand general concepts of Internet of Things (IoT)	K1
CO2	Recognize various devices, sensors and applications	K2
CO3	Apply design concept to IoT solutions	K3
CO4	Analyze various M2M and IoT architectures	K4
CO5	Create IoT solutions using sensors, actuators and Devices	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	M	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	H	M	L	M	H	H	H

Units	Content	Hrs
Unit I	IOT: What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	15
Unit II	IOT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4– BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security	14
Unit III	IOT ARCHITECTURE: IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	15
Unit IV	WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence	16
Unit V	IOT APPLICATIONS: IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc Case Studies: A Case Study of Internet of Things Using Wireless Sensor Networks and Smart Phones, Security Analysis of Internet-of-Things: A Case Study of August Smart Lock, Open IoT Platform	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	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things	Cisco Press	2017
2	Olivier Hersent, David Boswarthick, Omar Elloumi	The Internet of Things – Key applications and Protocols	Wiley Publications	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	ArshdeepBahga, Vijay Madiseti,	Internet of Things – A hands-on approach,	Universities Press	2015
2	Jan Ho" ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle	From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence	Elsevier	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. S. Niraimathi	Dr. S. Niraimathi	Mr. K. Srinivasan	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI5E2			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE-I : Soft Computing	Semester:	V
					Credits:	5

Course Objective

- Soft computing refers to principle components like fuzzy logic, neural networks and genetic algorithm, which have their roots in Artificial Intelligence.
- Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Identify and describe soft computing techniques and their roles in building intelligent machines	K1
CO2	Recognize the feasibility of applying a soft computing methodology for a particular problem	K2
CO3	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems	K3
CO4	Apply genetic algorithms to combinatorial optimization problems	K4
CO5	Apply neural networks to pattern classification and regression problems	K5

Mapping

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

Unit	Course contents	Hours
I	Neural Networks-1(Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.	15
II	Neural Networks-II (Back propagation networks): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perceptron model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications..	16
III	Fuzzy Logic-I (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.	14
IV	Fuzzy Logic –II (Fuzzy Membership, Rules): Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications&Defuzzificataions, Fuzzy Controller, Industrial applications.	15
V	Genetic Algorithm(GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.Rajasekaran, G.A.Vijayalaks hmiPai,	Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and	PHI Learning Pvt. Ltd.	2017

		Applications		
2	N.P.Padhy, S.P.Simon,	Soft Computing with MATLAB Programming	Oxford University Press	2015

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	S.N.Sivanandam , S.N.Deepa,	Principles of Soft Computing	Wiley India Pvt. Ltd., 2nd Edition	2011
2	SimanHaykin	Neural Networks and Learning Machines	Prentice Hall of India	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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI5E3			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE -I Mobile Application Development	Semester:	V
					Credits:	5

Course Objective

- Understand system requirements for mobile applications
- Generate suitable design using specific mobile development frameworks
- Generate mobile application design
- Implement the design using specific mobile development frameworks
- Deploy the mobile applications in marketplace for distribution

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the requirements for mobile applications	K1
CO2	Explain the challenges in mobile application design and development	K2
CO3	Develop design for mobile applications for specific requirements	K3
CO4	Design using Android SDK	K4
CO5	Implement the design using Objective C and iOS	K5

Mapping

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

Unit	Course contents	Hours
I	INTRODUCTION: Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications	16
II	BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – user interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.	14
III	ADVANCED DESIGN: Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.	15
IV	TECHNOLOGY I – ANDROID: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.	16
V	TECHNOLOGY II – IOS: Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.	14
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION

1	Jeff McWherter and Scott Gowell	Professional Mobile Application Development	Wrox	2012
2	Charlie Collins, Michael Galpin and Matthias Kappler	Android in Practice	DreamTech	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	James Dovey and Ash Furrow,	Beginning Objective C	Apress	2013
2	David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson,	Beginning iOS 6 Development: Exploring the iOS SDK	Apress	2013

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI519			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC Lab VI: Programming Lab in NLP	Semester:	V	
					Credits:	2	

Course Objectives

- To introduce the fundamental concepts and techniques of natural language processing (NLP).
- To understand natural language processing and to learn how to apply basic algorithms in this field.
- To understand the semantics and pragmatics of languages for processing.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	To demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.	K3
CO2	To understand the syntax, semantics and pragmatics of various languages.	K4
CO3	To analyse natural language processing and to learn how to apply basic algorithms in this field.	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
	Implementing word similarity. Implementing simple problems related to word disambiguation. Simple demonstration of part of speech tagging. Implementing Lexical analyzer. Implementing Semantic Analyzer. Implementing Sentiment Analysis.
	Total hrs 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python - Analyzing Text with the Natural Language Toolkit	O'Reilly Media, Sebastopol	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Christopher Manning and Hinrich Schütze	Foundations of Statistical Natural Language Processing	MIT Press,	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 Signature	Name: Dr. S. Niraimathi Signature	Name: Mr. K. Srinivasan Signature	Name: Mr. K. Srinivasan Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI520			Title	Batch:	2024-2027
				CC Lab VII : Big Data Technologies Lab	Semester:	V
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

- Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
- Understand different approaches for building HadoopMapReduce programs for real-time application
- Provide students a hands-on exposure to scientific programming using R.
- Provide wider knowledge to know about data structures in R and its types.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Utilize R for Big Data analytics.	K3
CO2	Configure Hadoop and perform File Management Tasks	K3
CO3	Appreciate and apply the R programming from a statistical perspective.	K4
CO4	Apply MapReduce programs to real time datasets	K4
CO5	Analyze the data sets using R programming capabilities.	K5
CO6	Critically analyze huge data set using Hadoop distributed file systems	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. Develop a MapReduce program to find the maximum temperature in each year. 2. Develop a MapReduce program to find the grades of student's. 3. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.

4. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.
5. XYZ.com is an online music website where users listen to various tracks, the data gets collected which is given below. The data is coming in log files and looks like as shown below.

UserId	TrackId	Shared	Radio	Skip
111115	242	0	1	0
111113	245	1	0	0
111117	243	0	1	1
111115	245	1s	0	0

Write a MapReduce program to get the following

- Number of unique listeners
- Number of times the track was shared with others
- Number of times the track was listened to on the radio
- Number of times the track was listened to in total Number of times the track was skipped on the radio
- Implement different data structures in R (Vectors, Lists, Data Frames)
- Write a program to read a csv file and analyze the data in the file in R
- Create pie charts and bar charts using R.
- Create a data set and do statistical analysis on the data using R.
- Write R program to find Correlation and Covariance
- Write R program for Regression Modeling
- Write R program to build classification model using KNN algorithm
- Write R program to build clustering model using K-mean algorithm

Total Hours 75

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Tom White	Hadoop: The Definitive Guide	Fourth Edition, O'reilly Media	2015

2	Dr. G. Sudhamathy & Dr. C. Jothi Venkateswaran	R Programming An Approach to Data Analytics	MJP Publishers	2024
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Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Glenn J. Myatt,	Making Sense of Data	John Wiley & Sons,	2007
2.	Pete Warden	Big Data Glossary	O'Reilly	2011

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI5S1			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Skill Based Elective III : AI for Cyber Security	Semester:	V
					Credits:	2

Course Objective

- The need for cyber security and its related threats and attacks.
- The methods for secure communication in the cyber world.
- The best practices and regulations related to cyber security

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the concepts of cybercrime	K1
CO2	Describe the Cyber Crime Strategy	K2
CO3	Identify the Cyber Crime Investigation Methodology	K3
CO4	Generalize the knowledge on Digital Forensics.	K3
CO5	Apply the Cyber Crime and Digital Forensics concepts in real-time scenarios.	K3

Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	H	M	H	M	M	L	M	L	M	M	H	H
CO2	L	H	L	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	Basics of Cyber crime : Introduction - Cyber Threat – Definition of Cyber Crime – Classification – Current Threats and Trends – Diversity of Cyber Crime – Cyber Hate Crimes – Cyber Terrorism - Need for cyber security.	12
Unit II	Responding to Cyber crime : Cyber Strategy – National Security Strategy – Cyber Security Strategy – Organized Crime Strategy – Cyber Crime Strategy - Policy Cyber Crime – International Response – National Cyber Security Structure – Strategic Policy Requirements – Police and Crime Commissioners.	11
Unit III	Investigating Cyber crime : Preventing Cyber Crime – Password Protection – Get Safe Online – Cyber Security Guidance for Business - Cyber Crime Investigation Skills – Criminal Investigation – Code of Ethics – Evidence – Hi-Tech Investigations – Capturing and Analyzing Digital Evidence.	12
Unit IV	Foundations of Digital Forensics :Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face-Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.	12
Unit V	Case Studies :Latest Study Topics on Cyber Crime and Investigations - Recent Cyber Crime Cases – Recent Digital Forensics Cases – Bridging the Gaps in Cyber Crime Investigations between the Cyber security stake holders.	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	Thomas Halt, Adam M. Bossler and Kathryn C. SeigfriedSpellar,	“Cybercrime and Digital Forensics: An Introduction”	Routledge Taylor and Francis Group	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bernadette H Schell, Clemens Martin	“Cybercrime”	ABC – ClioInc, California	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
Dr. B.Azhagusundari	Dr. S. Niraimathi	Mr. K. Srinivasan	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI5S2			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Skill Based Elective –III	Semester:	V
				Design Thinking	Credits:	2

Course Objective

To expose students to the design process as a tool for innovation.

To develop students' professional skills in client management and communication.

To make students develop a portfolio of work to set the map art in the job market.

To provide an authentic opportunity for students to develop teamwork & leadership skills.

To demonstrate the value of developing a local network and assist students in making lasting connections with the business community.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To develop a strong understanding of the Design Process and how it can be applied in a variety of business settings.	K1
CO2	To learn to build empathy for target audiences from different cultures.	K2
CO3	To learn to research and understand the unique needs of a company around specific challenges.	K3
CO4	To learn to develop and test innovative ideas through a rapid iteration cycle.	K4
CO5	To analyze and develop applications in logistics.	K5

Mapping

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

Unit	Course contents	Hours
I	Design thinking history and overview: Understand what came before Design thinking - Identify who did what to bring it about- Learn how it built upon previous approaches - How design thinking is introduced in an organization - Understand the transformation required - What outcomes are possible - Understand the whole approach to design thinking - Determine what is most important.	12
II	Key habits : Introduction to key habits - types-avoid common anti-patterns - Optimize for success with these habits - Introduction to loop - Importance of iteration - How to observe, Reflect &Make - Drill down and do tomorrow	12
III	User Research And Make : Importance of user research - Appreciate empathy through listening - Key methods of user research - How make fits into the loop - Leverage observe information - Ideation, storyboarding and Prototyping.	12
IV	User Feedback And Teaching: User feedback and the loop - Different types of user feedback - How to carryout getting feedback - Understand the challenges of teaching EDT - Valuable hints and tips - Ready to teach the course	13
V	Logistics And Applications : Understand what type of room you need - Learn what materials and supplies you need - Learn how to setup the room - Domains that are applicable - Digital versus physical - Explore some technology specialization	11
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATIO N
1	Tom Kelley, David Kelley	Creative Confidence: Unleashing the Creative Potential Within Us All	Currency	2013
2	Change by Design: How Design Thinking Transforms	Tim Brown	Kindle Edition	2009

	Organizations and Inspires Innovation			
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Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Nigel	Cross Design Thinking: Understanding How Designers Think and Work	Kindle Edition	2011
2	Design Thinking	E Balagurusamy	McGraw Hill, First Edition	2024

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI5S3			Title	Batch:	2022-2025
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE II: Human Computer Interaction	Semester:	VI
					Credits:	5

Course Objective

- To learn the foundations of Human Computer Interaction.
- To become familiar with the design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Design effective dialog for HCI	K1
CO2	Design effective HCI for individuals and persons with disabilities.	K2
CO3	Assess the importance of user feedback.	K3
CO4	To explain the HCI implications for designing multimedia / ecommerce / e-learning Web sites.	K3
CO5	Develop meaningful user interface	K4

Mapping

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

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

Unit	Course contents	Hours
I	FOUNDATIONS OF HCI: The Human I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. – Case Studies.	15
II	DESIGN & SOFTWARE PROCESS: Interactive Design - Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.	15
III	MODELS AND THEORIES: HCI Models - Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.	15
IV	MOBILE HCI: Mobile Ecosystem - Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools – Case Studies.	15
V	WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow – Case Studies.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale	Human Computer Interaction	3rd Edition, Pearson Education,	2004

2	Brian Fling	Mobile Design and Development	First Edition, O'Reilly Media Inc.,	2009
3	Bill Scott and Theresa Neil,	Designing Web Interfaces	First Edition, O'Reilly	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Gerard Jounghyun Kim	Human-Computer Interaction: Fundamentals and Practice	CRC Press	2015
2	Biele, Cezary	Human Movements in Human-Computer Interaction(HCI),	Springer International Publishing	2021
3	. RohitRaja, Shilpa Rani, Shrikant Tiwari, Sandeep Kumar	Cognitive Behavior and Human Computer Interaction Based on Machine Learning Algorithms,	Addison Wesley.	2022

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI5AL			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem		ALC I :Business Intelligence	Semester:	V
					Credits:	2

Course Objective

- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used in it
- Be exposed with different data analysis tools and techniques

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Explain the fundamentals of business intelligence.	K1
CO2	Link data mining with business intelligence.	K2
CO3	Apply various modeling techniques.	K3
CO4	Explain the data analysis and knowledge delivery stages.	K4
CO5	Apply business intelligence methods to various domains	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	BUSINESS INTELLIGENCE: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.	
Unit II	KNOWLEDGE DELIVERY: The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.	
Unit III	EFFICIENCY: Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis	
Unit IV	BUSINESS INTELLIGENCE APPLICATIONS: Marketing models – Logistic and Production models – Case studies.	
Unit V	FUTURE OF BUSINESS INTELLIGENCE: Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.	

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	Efraim Turban, Ramesh Sharda, DursunDelen,	Decision Support and Business IntelligenceSystems	9th Edition,Pearson.	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	David Loshin Morgan, Kaufman	Business Intelligence: The Savvy Manager's Guide	Second Edition	2012
2	.Carlo Vercellis	Business Intelligence: Data Mining and Optimization for Decision Making	Wiley Publications	2009
3	CindiHowson	Successful Business Intelligence: Secrets to Making BI a Killer App	McGraw- Hill	2007

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

SEMESTER VI

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI621			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	CC XI: Deep Learning	Semester:	VI
					Credits:	4

Course Objective

- To solve a wide range of problems in Computer Vision and Natural Language Processing.
- To learn about the building blocks used in these Deep Learning based solutions.
- To learn about feed forward neural networks, Convolutional neural networks, recurrent neural networks and attention mechanisms

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 Deep Learning.	K1
CO2	To Know the main techniques in Machine and Deep Learning principles	K2
CO3	Gaining knowledge of the different modalities of Deep learning currently used.	K3
CO4	Be able to design and implement deep neural network systems.	K4
CO5	Implement deep learning algorithms and solve real-world problems.	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 to Deep Learning – Applications of Deep Learning - The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron – FF Neural Networks – Types of Neurons – Softmax output layers.	15
Unit II	Tensor flow – Components of TensorFlow - Use cases/ Applications of TensorFlow – Features of TensorFlow – Architecture of TensorFlow - Variables – Operations – Placeholders – Sessions – Sharing Variables – Graphs – Visualization.	15
Unit III	Convolution Neural Network – Introduction to image processing - CNN Architecture - Feature Selection – Max Pooling – Filters and Feature Maps – Convolution Layer –Applications.	15
Unit IV	Recurrent Neural Network – Basic Components of RL - Memory cells – sequence analysis – word2vec- LSTM - Memory augmented Neural Networks – NTM - Applications: Text Generation, Speech Recognition	15
Unit V	Reinforcement Learning – MDP – Q Learning –Applications & Case Studies - Deep Learning in Healthcare, Computer Vision – NLP - Robotics	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	Nikhil Buduma, Nicholas Locascio	Fundamentals of Deep Learning; Designing Next Generation Machine Intelligence Algorithms	O'Reilly Media	2017
2	Ian Goodfellow and Yoshua Bengio and Aaron Courville	Deep Learning	MIT Press book	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	RaulRojas	NeuralNetworks:ASystematic Introduction		1996
2	ChristopherBishop	PatternRecognitionandMachineLearning		2007

Web References

<https://www.geeksforgeeks.org/deep-learning-tutorial/>

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

<https://www.datacamp.com/tutorial/tutorial-deep-learning-tutorial>

<https://www.javatpoint.com/deep-learning>

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	Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E4			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	Title: UI/UX Design	Semester:	VI
					Credits:	4

Course Objective

- Provide students with the knowledge of user- centered design, user -centered methods in design, graphic design on screens, simulation and prototyping techniques, Usability testing methods, interface technologies and user centered design in corporate perspective.
- To analyzethe iterative design of a graphical user interface to organize information about users into useful summaries with affinity diagrams, to convey user research findings with personas and scenarios and to learn the skill of sketching as a process for user experience design.
- Provide Exposure to wireframing and Prototyping software in the various UI/UX Design tools

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Build UI for user Applications	K1
CO2	Evaluate UX design of any product or application	K2
sCO3	Demonstrate UX Skills in product development	K3
CO4	Implement Sketching principles	K4
CO5	Create Wireframe and Prototype	K5

Mapping

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

Unit	Course contents	Hours
I	Foundations Of Design: UI vs. UX Design – Core Stages of Design Thinking – Divergent and Convergent Thinking -Brainstorming and Game storming – Observational Empathy	12
II	Foundations of UI Design: Visual and UI Principles- UI Elements and Patterns – Interaction Behaviors and Principles –Branding- Style Guides	12
III	Foundations Of UX Design: Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals	12
IV	Wireframing, Prototyping And Testing: Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration	12
V	Research, Designing, Ideating, & Information Architecture: Identifying and Writing Problem Statements – Identifying Appropriate Research Methods – Creating Personas – Solution Ideation – Creating User Stories – Creating Scenarios – Flow Diagrams – Flow Mapping – Information Architecture	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joel Marsh,	UX for Beginners,	OReilly	2024
2	Jon Yablonski,	Laws of UX using Psychology to Design Better Product & Services	OReilly	2021

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISH ERS \ EDITION	YEAR OF PUBLICATION
1	Russ Unger and Carolyn Chandler.	A Project Guide to UX Design: For user experience designers in the field or in the making	New Riders Publishing, USA, (2nd. ed.).	2012
2	Wilbert O. Galitz	The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques	Wiley Publishing, 2007Third Edition.	2007

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

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E5			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	DSE II: Gen AI	Semester:	VI
					Credits:	5

Course Objective

- To learn the fundamental soft Neural Networks and the various types.
- To explore Generative AI models like GANs, VAEs, and Transformers.
- To analyze the limitations of traditional RNNs and LSTMs.
- To discuss current trends and future directions in Generative AI research

Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the evolution of AI and the significance of Deep Learning.	K1
CO2	Apply various Neural Network architectures for tasks like image recognition and sequence modeling.	K2
CO3	Analyze data preprocessing and training techniques for neural networks.	K3
CO4	Design practical solutions using advanced neural networks for diverse applications	K3
CO5	Create a application using DL	K4

Mapping

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

Unit	Course contents	Hours
I	Foundational Concepts: Introduction to Artificial Intelligence - Machine Learning Fundamentals - Deep Learning Basics - Python Programming for AI.	12
II	Generative AI Models: Generative Adversarial Networks (GANs) - Variational Autoencoders (VAEs) - Transformers and Large Language Models (LLMs) – Auto encoders - Reinforcement Learning.	12
III	Hands-on Projects: Image Generation - Text Generation - Audio Generation - Application Development.	12
IV	Advanced Topics (Optional): Generative AI for Specific Domains - Medicine - Science - Art and Design - Ethical Considerations in Generative AI - Prompt Engineering.	12
V	Assessment: Quizzes and exams on theoretical concepts, Coding assignments and projects, and Final project presentation.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Altaf Rehmani	“Generative AI for everyone: Understanding the essentials and applications of this breakthrough technology		2009
2	Numa Dhamani	Introduction to Generative AI	, Kindle Edition	2024
3	y Charu C. Aggarwal.	"Neural Networks and Deep Learning: A Textbook		

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Josh Kalin	"Generative Adversarial Networks Cookbook: Over 100 recipes to build generative models using Python, TensorFlow, and Keras		
2	Jesse Sprinter	“Generative AI in Software Development: Beyond the Limitations of Traditional Coding		2024

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E6			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	4	Tutorial Hrs./Sem.	60	DSE -II	Semester:	VI
				Text Analytics	Credits:	4

Course Objective

- To study the nature of text as a data source for knowledge discovery and identify its relevance to the information needs of diverse individuals, communities and organizations.
- To study some of the techniques by which text is automatically processed.
- To demonstrate the types of information which can be extracted from text, and the applications of these types.
- To examine the tools which support various types of text processing and analysis and apply them to address information needs, questions, and issues.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe the basics of text analytics	K1
CO2	Describe text analysis classification.	K2
CO3	Apply various text clustering techniques	K3
CO4	Explain n gram feature extraction and language models	K4
CO5	Interpret text data using visualization techniques	K5

Mapping

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

Unit	Course contents	Hours
I	An Introduction to Text Mining: Approaches to Text Analysis, Information Extraction from Text- Named Entity Recognition Rule-based Approach, Statistical Learning Approach. Relation Extraction -Feature-based Classification, Kernel Methods, Weakly Supervised Learning Methods - Unsupervised Information Extraction -Relation Discovery and Template Induction, Open Information Extraction. Basic text processing-tokenization, Stop word removal, Stemming and lemmatization, Language Models and Text Statistics.	12
II	Text Summarization Techniques: Topic Representation Approaches -Influence of Context Indicator Representations and Machine Learning for Summarization- Graph Methods for Sentence Importance Selecting Summary Sentences- Greedy Approaches: Maximal Marginal Relevance, Global Summary Selection	12
III	Classification for Text Analysis: Text Classification -Identifying Classification problems , Classifier Models ,Building a Text Classification Application -Cross-Validation , Model Construction ,Model Evaluation ,Model Operationalization Clustering for Text SimilarityUnsupervised Learning on Text -Clustering by Document Similarity- Distance Metrics , Partitive Clustering , Hierarchical Clustering -Modeling Document -Latent Dirichlet Allocation , Latent Semantic Analysis ,Non-Negative Matrix Factorization.	12
IV	Context-Aware Text Analysis: Grammar Based Feature Extraction - Context-Free Grammars , Syntactic Parsers ,Extracting Key phrases - Extracting Entities- n-Gram Feature Extraction , An n-Gram-Awar-Choosing the Right n-Gram Window- n-Gram Language Models - Frequency and Conditional Frequency ,Estimating Maximum Likelihood Text Visualization.-Visualizing Feature Space - Visual Feature Analysis , Guided Feature Engineering - Model Diagnostics - Visualizing Clusters ,Visualizing Classes ,Diagnosing Classification Error , Visual Steering - Silhouette Scores and Elbow Curves.	12
V	Graph Analysis of Text: Graph Computation and Analysis, Creating a Graph-Based Thesaurus ,Analyzing Graph Structure, Visual Analysis of Graphs , Extracting Graphs from Text - Creating a Social Graph. Entity Resolution -Entity Resolution on a Graph, Blocking with Structure, Fuzzy Blocking Cluster Computing with Spark- Sentiment Analysis- Deep Structure Analysis.	12
Total		60

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bilbro, Rebecca, Tony Ojeda, and Benjamin Bengfort.	Applied text analysis with Python	O'Reilly	2019
2	Aggarwal, Charu C., and ChengXiangZhai	Mining Text Data	Springer Publications Kindle Edition	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ignatow, Gabe, and RadaMihalcea.	An introduction to text mining: Research design, data collection, and analysis.	Sage Publications	2017
2	Struhl, Steven.	Practical text analytics: Interpreting text and unstructured data for business intelligence.	Kogan Page Publishers.	2015

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E7			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE- III	Semester:	VI
				AR/VR	Credits:	4

Course Objective

- To introduce the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socioeconomic impact and issues
- To understand virtual reality, augmented reality and using them to build Biomedical engineering applications
- To know the intricacies of these platform to develop PDA applications with better optimality

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Under the concept of realistic engineering	K1
CO2	Analyse & Design a system or process to meet given specifications with realistic engineering constraints.	K2
CO3	Identify problem statements and function as a member of an engineering design team	K3
CO4	Utilize technical resources	K4
CO5	Propose technical documents and give technical oral presentations related to design mini project results.	K5

Mapping

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

Unit	Course contents	Hours
I	INTRODUCTION :The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.	15
II	VR DEVELOPMENT PROCESS :Geometric modeling - kinematics modeling- physical modeling - behaviour modeling – model Management.	15
III	CONTENT CREATION CONSIDERATIONS FOR VR :Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness - side effects of exposures to virtual reality environment	15
IV	VR ON THE WEB & VR ON THE MOBILE 9 JS-pros and cons-building blocks (WebVR, WebGL, Three.js, device orientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics	15
V	APPLICATIONS medical applications-military applications-robotics applications- Advanced Real time Trackingother applications- games, movies, simulations, therapy.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jos Dirksen, Packt	The JavaScript 3D Library for WebGL - Second Edition	II	2015

2	Jason Jerald	The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool		2015
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Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Joerg Osarek,	Virtual Reality Analytics	Gordon's Arcade	2016
2	Dieter Schmalstieg & Tobias Hollerer	Augmented Reality: Principles and Practice (Usability)	Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States,	2016. ISBN: 9780321883575
3	Steve Aukstakalnis, Addison-Wesley Professional	Practical Augmented Reality: A Guide to the Technologies, pplications, and Human Factors for AR and VR (Usability)	I	2016

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E8			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE- III Open Source Technologies in AI	Semester:	VI
					Credits:	5

Course Objective

- Understand the fundamentals of Open Source Software (OSS) in AI.
- Learn about open-source AI frameworks and tools.
- Explore open datasets and model repositories.
- Gain hands-on experience with popular AI libraries.
- Build simple AI projects using open-source technologies.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the principles and benefits of open-sourced AI.	K1
CO2	Utilize popular open-source AI frameworks and libraries to build AI models.	K2
CO3	Collaborate on and contribute to open-source AI projects.	K3
CO4	Apply open-source AI tools to solve real-world problems.	K4
CO5	Implement Open Source Projects	K5

Mapping

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

Unit	Course contents	Hours
I	Open Source- Importance in AI - Benefits and Challenges of Open Source AI - Overview of Open Source AI Tools and Frameworks - Understanding Open Data and Community Contributions	15
II	Introduction to TensorFlow and PyTorch - Overview of Scikit-Learn for Machine Learning - Hugging Face and Transformers for NLP - OpenCV for Computer Vision	15
III	Open Datasets - Importance in AI Research -Introduction to Kaggle, Google Dataset Search, and OpenAI Datasets - Using Model Repositories like Hugging Face and TensorFlow Hub - Ethical Considerations in Open Data Usage	15
IV	Introduction to Git and GitHub for Open Source Contribution - Understanding AI Model Licensing (Apache, MIT, GPL)-How to Contribute to Open Source AI Projects-Exploring AI Development with Jupyter Notebooks	15
V	Introduction to AI Model Deployment (Flask, FastAPI) - Hosting AI Models Using Open Source Cloud Platforms (Hugging Face Spaces, Streamlit) - Exploring MLOps for Open Source AI - Future of Open Source in AI (AI Ethics, Responsible AI, Federated Learning)	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Sebastopol, CA: O'Reilly Media	Geron, Aurelien. Hands-On Machine Learning with Scikit- Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems	2nd ed.,	2019

2	Paszke, Adam, et al.	Deep Learning with PyTorch.	Shelter Island, NY: Manning Publications,	2021
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Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISH ERS \ EDITION	YEAR OF PUBLICATION
1	Chollet, Francois	Deep Learning with Python	Shelter Island, NY: Manning Publications,	2021
2	Raschka, Sebastian, and Vahid Mirjalili.	Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow	2. 3rd ed. Birmingham, UK: Packt Publishing	2019

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6E9			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75	DSE-III Robotics & its Applications	Semester:	VI
					Credits:	5

Course Objective

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End of Effectors and Sensors
- To impart knowledge in Robot Kinematics and Programming.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the fundamentals of robots.	K1
CO2	Know the concepts of sensors and machine vision.	K2
CO3	Analyze navigation controls for operating robotics.	K3
CO4	Observe and analyze the planning and navigation of obstacle avoidance.	K4
CO5	Apply the principles using Robotic environment	K5

Mapping

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

Unit	Course contents	Hours
I	Introduction, brief history, types, classification and usage, science and technology of robots, Artificial Intelligence in Robotics, some useful websites, textbooks and research journals	15
II	Elements of Robots-Joints, Links, Actuators, and Sensors: Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kind of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders-tachometers-strain gauge-based force torque sensor-proximity and distance measuring sensors-and vision	15
III	End Effectors: Classification of end effectors-tools as end effectors-drive system for grippers-mechanical adhesive- vacuum magnetic-grippers-hooks and scoops-gripper force analysis-and gripper design- active and passive grippers	15
IV	Planning and Navigation: Introduction, path planning-overview-road map path planning-cell decomposition path planning- potential field path planning-obstacle avoidance-case studies	15
V	Vision system: Robotic vision systems-image representation-object recognition- and categorization-depth measurement- image data compression-visual inspection-software considerations. Robot Programming: Introduction to robot languages-VAL-RAPID-language-basic commands-motion instructions - pick and place operation using industrial robot manual mode-automatic mode-subroutine command based programming-move master command language-introduction-syntax-simple problems.	15
Total		75

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Richard D. Klatner, Thomas, Achmielewski and Mickael Negin,	Robotic Engineering an Integrated approach	Prentice Hall	2001

2	SaeedB.Nikku,	Introduction to Robotics, analysis, control and applications	Wiley-India 2nd edition	2011
3	Groover M.P.,	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001
4	Craig J.J.,	Introduction to Robotics Mechanics and Control	Pearson Education	2008

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISH ERS \ EDITION	YEAR OF PUBLICATION
1	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company,	2008
2	S.R. Deb	Robotics technology and flexible automation	TMH	2009
3	R. Schalkoff,	Pattern Recognition – Statistical, Structural and Neural Approaches	John Wiley	2007

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

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)		
Course Code:	24UAI622			Title	Batch:	2024 - 2027	
Lecture Hrs./Week or Practical Hrs./Week	6	Tutorial Hrs./Sem.	90	CC Lab IX: Deep Learning Lab	Semester:	VI	
					Credits:	2	

Course Objectives

- To Build The Foundation Of Deep Learning.
- To Understand How To Build The Neural Network.
- To enable students to develop successful machine learning concepts.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Learn The Fundamental Principles Of Deep Learning.	K3
CO2	Identify The Deep Learning Algorithms For Various Types of Learning Tasks in various domains.	K4
CO3	Implement Deep Learning Algorithms And Solve Real-world problems.	K5

Mapping

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

Units	Content
	1. Setting up the Spyder IDE Environment and Executing a Python Program 2. Installing Keras, Tensorflow and Pytorch libraries and making use of them 3. Applying the Convolution Neural Network on computer vision problems 4. Image classification on MNIST dataset (CNN model with Fully connected layer) 5. Applying the Deep Learning Models in the field of Natural Language Processing 6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes 7. Applying the Auto encoder algorithms for encoding the real-world data 8. Applying Generative Adversial Networks for image generation and unsupervised tasks.
	Total Hours 90

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bishop, C. M.	Pattern Recognition and Machine Learning,	Springer	2006
2	Yegnanarayana, B.	Artificial Neural Networks	PHI Learning Pvt. Ltd,	2009

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Ian Goodfellow, YoshuaBengio and Aaron Courville,	Deep Learning	MIT Press	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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI623			Title	Batch:	2024-2027
				CC Lab X: Power BI Data Visualization Lab	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week	5	Tutorial Hrs./Sem.	75		Credits:	2

Course Objective

Understand the core features and functionalities of Power BI.

Learn how to navigate the Power BI interface, including Power BI Desktop and Power BI Service.

Familiarize with Power BI components like reports, dashboards, and datasets.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO3	Gain an understanding of Power BI Desktop and Power BI Service.	K4
CO4	Learn how to navigate the Power BI interface, tools, and features.	K4
CO5	Familiarize with the Power BI environment for effective report building.	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
	(PowerBI): Import data from different sources (CSV, text, web). (Power BI): Import data from Excel, databases, and other sources. (Power BI): Combine multiple tables using Merge Queries in Power Query Editor. (Power BI): Aggregate data using Group By in Power Query. (PowerBI): Transform date and time data. (Power BI): Create calculated columns and measures. (Power BI): Pivot and Unpivot data in Power Query. (PowerBI): Create charts and graphs for data visualization. (Power BI): Create basic reports and dashboards. (Power BI): Use slicers and filters to create interactive reports. (Power BI): Use Bookmarks and Selections for dynamic reports. (Power BI): Implement custom visuals. (Power BI): Set up Power BI refresh schedule for live data.
	Total Hours 75

Text Books:

S.N O	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Robert Spence	Information Visualization: An Introduction	Third Edition, Pearson Education	2014
2	Colin Ware	Information Visualization Perception for Design	Third Edition, Morgan Kaufmann	2012

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Matthew O.Ward, George Grinstein, Daniel Keim,	Interactive Data Visualization: Foundation, Techniques and Applications	Second Edition, A.K.Peters/CRC Press	2015

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Programme Code:	B.Sc		Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	23UAI624		Title	Batch:	2024– 2027
			Project	Semester:	VI
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem.		Credits:	3

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6S4			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	Skill Based Elective II	Semester:	VI
				Social & Ethical Issues in AI	Credits:	2

Course Objective

- To analyze whether AI poses an existential threat to humanity.
- To check learning algorithms from acquiring morally objectionable biases.
- To study the ethical rules to be followed in using self driving cars.
- To check the accountability while building artificial moral agents.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate knowledge of philosophical issues involved in ethics of AI.	K1
CO2	Develop a super intelligent system without having to reveal the system itself.	K2
CO3	Understand workplace automation in employment.	K3
CO4	Appreciate the potential responsibility in handling ethics of artificial moralagents	K4
CO5	To build intelligent systems those are safe without any global risk.	K5

Mapping

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

CO5	M	M	L	H	M	H	M	M	M	M	M	H
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Unit	Course contents	Hours
I	Ethics in Machine learning and other domain-specific AI algorithms- Artificial general intelligence - machines with moral status - minds with exotic properties - super intelligence. Singularity - A philosophical Analysis: Argument for a singularity-Intelligence explosion without intelligence.	9
II	Orthogonality of motivation and intelligence-instrumental convergence. Racist AI: Rise of algorithmic decision making: contestable epistemic and normative assumptions-embodied values- algorithmic accountability as public reason-objections, limitations and challenges.	9
III	Real world of robots at war-autonomous weapon systems-robot warriors and crimes-human oversight for avoiding problem-responsibility for robot war crimes-robot warriors and child soldiers. Future of workplace automation-interaction of automation and employment.	9
IV	Moral agency and moral norms-moral turing test-Theoretical approaches: consequentialism- deontology-models of morality: Virtue approaches-associative learning-evolutionary approaches- role of emotions. Ethics of self driving cars: need for ethics settings-an applied trolley problem- empirical ethics.	9
V	Anthropomorphic bias: width of mind design space-Prediction and design-understanding the power of intelligence-capability and motive: Optimization processes-aiming at the target-friendly AI- technical failure and philosophical failure - rates of intelligence increase-hardware-threats and promises - AI vs Human Intelligence Enhancement	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Bill Hibbord	Ethical Artificial Intelligence	Machine Intelligence Research Institute, CA	2015
2	eds. William Ramsey and Keith Frankish	Cambridge Handbook of Artificial Intelligence	Cambridge University Press	2011
2	Nick Bostrom And Eliezer Yudkowsky Edited by Keith Frankish and William M. Ramsey	The ethics of artificial intelligence	Published online by Cambridge University Press	2014

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Chalmers. D	The Singularity: A Philosophical Analysis,	Journal of Consciousness Studies	2010
2	Bostrom, N	The Superintelligent Will: Motivation and Instrumental Rationality in Advanced Artificial Agent	Minds & Machines	2012

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: Mr. K. Srinivasan
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Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6S5			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	Skill Based Elective II: Computer Vision	Semester:	VI
					Credits:	2

Course Objective

- To understand the basic principles of image formation, image processing algorithms and recognition from single or multiple images (video).
- To emphasize the core vision tasks of scene understanding and recognition.
- To develop Applications to object recognition, image analysis, image retrieval and object tracking

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn fundamentals of computer vision and its applications	K1
CO2	Understand the basic image processing operations to enhance, segment the images.	K2
CO3	Understand the analyzing and extraction of relevant features of the concerned domain problem	K3
CO4	Analyze and apply the motion concepts and its relevance in real time applications	K4
CO5	Apply the knowledge in solving high level vision problems like object recognition, image classification	K5

Mapping

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

CO4	S	M	M	L	M	M	L	M	L	H	H	L
CO5	M	M	L	H	M	H	M	M	M	M	M	H

Unit	Course contents	Hours
I	Overview of computer vision and its applications: Image Formation and Representation: Imaging geometry, radiometry, digitization, cameras and Projections, rigid and affine transformation	9
II	Image Processing: Pixel transforms, color transforms, histogram processing, histogram equalization, filtering, convolution, Fourier transformation and its applications in sharpening, blurring and noise removal	9
III	Feature detection: Edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors, Morphological operations Segmentation: Active contours, split & merge, watershed, region splitting, region merging, graph-based segmentation, mean shift and model finding, Normalized cut	9
IV	Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models. Motion representation: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation	9
V	Motion tracking: statistical filtering; iterated estimation; observability and linear systems; the Kalman filter Object recognition and shape representation: alignment, appearance-based methods, invariants, image eigenspaces	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	R. Szeliski,	Computer Vision: Algorithms and Applications	Springer	2011
2	D. A. Forsyth and J. Ponce	Computer Vision: A Modern Approach	Pearson Education,	2003

Reference Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	E. Trucco and A. Verri,	Introductory techniques for 3D computer vision,	Prentice Hall	1998
2	R. Schalkoff,	Pattern Recognition – Statistical, Structural and Neural Approaches	John Wiley	2007

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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Signature	Signature	Signature	Signature

Programme Code:	B.Sc.			Programme Title:	AI and ML	
Course Code:	24UAI6S6			Title	Batch:	2024-2027
Lecture Hrs./Week or Practical Hrs./Week	3	Tutorial Hrs./Sem.	45	Skill Based Elective II: Recommender Systems	Semester:	VI
					Credits:	2

Course Objective

- To know the concept of recommender systems and machine learning algorithms used for prediction
- To get the knowledge of various algorithms to build recommendations based on contextual parameters
- To understand other related issues, such as evaluation methods, and implication of Recommender system on society

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Familiarize with recommender systems and their applications	K1
CO2	Analyze the different approaches towards recommendation	K2
CO3	Evaluate the effectiveness of recommender system	K3
CO4	Design recommender system	K4
CO5	Build an effective recommender system.	K5

Mapping

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

Unit	Course contents	Hours
I	An Introduction to Recommender Systems: Goals of Recommender Systems, Basic Models of Recommender Systems, Domain-Specific Challenges in Recommender Systems, introduction to Advanced Topics and Applications	9
II	Collaborative Filtering: User-based nearest neighbour recommendation, Item-based nearest neighbour recommendation, Model based and pre-processing based approaches, Attacks on collaborative recommender systems	9
III	Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms	9
IV	Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders. Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies.	9
V	Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centered metrics	9
Total		45

Pedagogy

Direct Instruction, Flipped Class, Digital Presentation

Assessment Methods:

Seminar, Quiz, Assignments, Group Task.

Text Books:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Jannach D., Zanker M. and FelFering A.,	Recommender Systems: An Introduction,	Cambridge University Press 1st ed.	2011
2	Ricci F., Rokach L., Shapira D., Kantor B.P	Recommender Systems Handbook	Springer, 1st ed.	2011
3	Aggarwal, C. C.	Recommender Systems: The Textbook.	Springer	2016

Reference Book:

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISH ERS \ EDITION	YEAR OF PUBLICATION
1	Manouselis N., Drachsler H., Verbert K., Duval E.,	Recommender Systems For Learning	Springer 1st ed	2013

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: Mr. K. Srinivasan
Signature	Signature	Signature	Signature

Programme Code:	B.Sc			Programme Title:	Bachelor of Science (Computer Science with AI & ML)	
Course Code:	24UAI6AL			Title	Batch:	2024 - 2027
Lecture Hrs./Week or Practical Hrs./Week		Tutorial Hrs./Sem		ALC-II: Quantum Computing	Semester:	VI
					Credits:	2

Course Objective

- Learn key concepts such as superposition, entanglement, and quantum measurement.
- Study qubits, quantum gates, and quantum circuits.
- Analyze fundamental algorithms, including Shor's algorithm, Grover's search, and quantum Fourier transform.

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic principles of quantum mechanics that underpin quantum computing.	K1
CO2	Learn the differences between classical computing and quantum computing.	K2
CO3	Explore the historical development of quantum computing and its potential future applications.	K3
CO4	Gain an understanding of key quantum mechanics concepts such as superposition, entanglement, and interference.	K4
CO5	Learn about quantum states, quantum bits (qubits), and how they differ from classical bits.	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	Course Contents	Hrs
I	Introduction to Quantum Computing - What is Quantum Computing? - Difference Between Classical and Quantum Computers - Basic Concepts of Quantum Mechanics: Qubits vs. Classical Bits - Superposition and Entanglement (Simple Explanation) - Real-Life Examples of Quantum Effects - Case Study: Why Do We Need Quantum Computers?.	
II	Qubits and Quantum States: Understanding Qubits (Quantum Bits) - The Bloch Sphere (Basic Explanation) - Superposition: How a Qubit Can Be 0 and 1 at the Same Time - Quantum Measurement: How Qubits Collapse to 0 or 1 - Simple Demonstration: Simulating a Qubit Using Python (Optional).	
III	Basic Quantum Gates and Circuits: Introduction to Quantum Gates: NOT Gate (X Gate) - Hadamard Gate (H Gate) - CNOT Gate (Controlled NOT) - How Quantum Circuits Work - Simple Quantum Circuit Examples - Hands-On: Drawing a Quantum Circuit (Paper or Online Simulators).	
IV	Introduction to Quantum Algorithms: What is a Quantum Algorithm? - Simple Examples: Deutsch Algorithm (Basic Problem Solving) - Grover's Algorithm (Search Optimization) - How Quantum Computing Can Solve Problems Faster - Case Study: How Quantum Computing Can Help in Real Life.	
V	Applications and Future of Quantum Computing: How Quantum Computers Can Help in: Cryptography and Cybersecurity - Medicine and Drug Discovery - Artificial Intelligence (AI) - Solving Complex Scientific Problems - Challenges and Limitations of Quantum Computers - Future of Quantum Technology - Final Discussion: What's Next for Quantum Computing?.	
	Total	SS

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	Michael A. Nielsen and Isaac L. Chuang	"Quantum Computation and Quantum Information"	10th	2011
2	Jack D. Hidary	"Quantum Computing: An Applied Approach"	I	2021

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1	Chris Bernhardt	"Quantum Computing for Everyone"	The MIT Press	2019
2	Noson S. Yanofsky and Mirco A. Mannucci	"Quantum Computing for Computer Scientists"	I	2008

Course Designed by	Head of the Department	Curriculum Development Cell	Controller of the Examination
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