PSGR
Krishnammal College for Women

B.Sc. Computer Science (Artificial Intelligence)

CHOICE-BASED CREDIT SYSTEM (CBCS)

AND

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)

CURRICULUM AND SCHEME OF EXAMINATION

SYLLABUS

2022 – 2025 Batch

Programme Learning Outcomes (PLO)

After completion of the Programme, the students will be able to

PLO1: Exhibit technical and technological knowledge in core areas of computer science and Artificial Intelligence.

PL02: Apply technical, problem solving skills and critical thinking to provide solutions for real world complex problems.

PLO3: Acquire professional proficiency to accomplish employability and entrepreneurship

PLO4: Advance skills to gain global competency and innovate in developing and deploying AI applications

PLO5: Acquire holistic development with strong emphasis on values and ethics

PLO6: Uphold social responsibilities in alignment with their roles

Programme Specific Outcomes (PSO)

The students at the time of graduation will

PSO1: Apply technical skills attained through laboratory exercises, projects, internships and value added programmes to solve multi-disciplinary problems

PSO2: Analyze a problem, identify and define the requirements appropriate to obtain solution

PSO3: Design AI experiments, carry out analysis and interpretation of data, to provide valid conclusions for decision making

PSO4: Adapt to emerging technologies to design and implement solutions for societal needs

PSO5: Create systems by applying modern tools for the complex activities

PSO6: Apply ethical principles and responsibilities in all the activities they involve

PSO7: Function effectively as an individual, and as a member or leader in diverse teams

PSO8: Recognize the need and have the ability to engage in independent and life-long learning in the broadest context of technological changes

PSGR Krishnammal College for Women

B.Sc. Computer Science (Artificial Intelligence)

2022 - 2025 BATCH

SEMESTER I to VI

Semester	Part	Subject Code	Title of the Course	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2201/ HIN2201/ FRE2201	Language I	Language	6	88	2	3	25	75	100	3
	II	ENG2101	English Paper I	English	6	88	2	3	25	75	100	3
	III	AI22C01	**Core 1:** Object-Oriented Programming	CC	4	58	2	3	25	75	100	4
	III	PP22C02	**Core 2:** Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	3	100#	-	100	3
	III	AI22CP1	**Core Practical Lab I:** Object-Oriented Programming lab	CC	3	45	-	-	25	75	50	2
	III	TH22A25	**Allied A1:** Linear Algebra	GE	6	88	2	3	25	75	100	5
	IV	NME21ES	Introduction to Entrepreneurship	AEC	2	28	2	2	100	-	100	2
	IV	NME22A1/ NME22B1	Advanced Tamil / Basic Tamil	AEC	2	29	1	2	25	75		
II	I	TAM2202/ HIN2202/ FRE2202	Language II	Language	6	88	2	3	25	75	100	3
	II	ENG2102	English Paper II	English	5	73	2	3	25	75	100	3
	III	AI22C03	**Core 3:** Data Science and Python	CC	4	58	2	3	25	75	100	4
	III	AI22CP2	**Core Practical Lab II:** Python Lab	CC	3	45	-	3	25	25	50	2
	III	AI22CP3	**Core Practical Lab III:** SPSS and Advanced Excel Lab	CC	3	45	-	3	50	50	50	2
	III	TH22A26	**Allied A2:** Statistics for Computer Science	GE	6	88	2	3	25	75	100	5
	IV		**Open Course:** (Self-study- Online Course)	AEC	-	-	-	-	-	-	-	Grade
	V	21PEPS1	Professional English For Physical Sciences	AEC	3	40	5	2	100	-	100	2
	IV	NME22A2/ NME22B2	Advanced Tamil /Basic Tamil	AEC	-	-	-	-	-	-	-	Grade
	VI	NM12GAW	General Awareness	Self-Study			OT	100				Grade

III	I	TAM2203A/ HIN2203A/ FRE2203A	Language III	Language	4	58	2	3	50	50	100	3
	II	ENG2203A	English III	English	4	58	2	3	50	50	100	3
	III	AP22C04	**Core 4:** Operating System Fundamentals - Linux	CC	4	58	2	3	50	50	100	3
	III	AI22C05	**Core 5:** Data Structures	CC	4	58	2	3	50	50	100	3
	III	AI22CP4	**Core Practical Lab IV:** DBMS Lab	CC	5	75	-	3	25	25	50	4
	III	AI22SBP1/ AI22SBCE	**SBS I:** R Programming / Coursera- IBM Applied AI	SEC	3	41	4	-	100	-	100	3
	III	TH22A27	**Allied A3:** Discrete Mathematics	GE	4	58	2	3	50	50	100	3
	IV	NM22EVS	**Foundation Course II:** Environmental Studies	AECC	Self-Study	-	-	-	100	-	100	Grade
	IV	NM22UHR	**Foundation Course III:** Universal Human Values and Human Rights	AECC	2	28	2	-	100	-	100	2
III & IV	IV		**Job Oriented Course:** Amazon Web Services / CISCO Certified Network Associate / Microsoft Windows Server Administration / Microsoft Power BI	-	-	-	-	-	-	-	-	Grade
IV	I	TAM2204A/ HIN2204A/ FRE2204A	Language IV	Language	4	58	2	3	50	50	100	3
	II	ENG2204A	English IV	English	4	58	2	3	50	50	100	3
	III	AI22C06	**Core 6:** Big Data Framework	CC	4	58	2	3	50	50	100	3
	III	AI22C07	**Core 7:** Data Mining	CC	3	43	2	3	50	50	100	3
	III	AI22CP5	**Core Practical Lab V:** Big Data Framework Lab	CC	3	45	-	3	25*	25*	50	3
	III	AI22CP6	**Core Practical Lab VI:** Data Mining Lab	CC	3	45	-	3	25*	25*	50	2
	III	AI22SBP2	**SBS II:** Data Visualization Tools	SEC	3	41	4	-	100	-	100	3
	III	AP22A01 / CS22A02/ AP22A03	**Allied A4:** **Paper I:** Digital Marketing **Paper II:** M-Commerce **Paper III:** Digital Electronics and Microprocessor	GE	4	58	2	3	50	50	100	3
	IV	NM22DTG	**Foundation Course IV:** Design Thinking	Finishing School - Part A	2	30	-	-	100	-	100 #	2
	V		NSS/NCC/YRC/Sports & Games	AEC	-	-	-	-	-	-	100	1
	V	COM15SER	Community Oriented Service	AEC	-	-	-	-	-	-	-	Grade
V	III	AI22C08	**Core 8:** Software Engineering	CC	4	58	2	3	50	50	100	3
	III	AI22C09	**Core 9:** Modern Artificial Intelligence	CC	4	58	2	3	50	50	100	3
	III	AI22C10	**Core 10:** Machine Learning	CC	5	73	2	3	50	50	100	4

V	III	AI22CP7	**Core Practical Lab 7**: Artificial Intelligence Lab – I	CC	4	60	-	3	25	25	50*	3
	III	AI22CP8	**Core Practical Lab 8:** Machine Learning Lab	CC	3	45	-	3	25	25	50*	3
	III	AI21E01/ AI22E02/ AI22E03	**Elective:** Internet of Things / Natural Language Processing / Information Retrieval	DSE	5	73	2	3	50	50	100	4
	III	AI21SBCE/ AI21SBP4	Coursera: IBM Applied AI / SBS IV : Data Analytics Tools	SEC	3	45/ 41	-/4	-	100/ 100	- / -	100	3
	III	AI21AC1 / AI21AC2	ALC : Business Domains for Artificial Intelligence ALC : Business Intelligence	ACC	-	-	-	3	25	75	100 **	5
	IV	NM21CS1	Cyber Security	AECC	2	30	-	-	100	-	100	Grade
	IV	AI22INST	Field work / Institutional Training	DSE	-	-	-	-	100	-	100	2
	VI	AI22COM	Comprehensive Exam	GC	-	-	-	1	-	100	100	Grade
	VI	16BONL1 16BONL2	Online Course -I Online Course -II	ACC	-	-	-	-	-	-	-	-
	VI	COM15SER	Community Service	GC	-	-	-	-	-	-	-	-
VI	III	AI22C11	Computer Networks	CC	5	73	2	3	50	50	100	3
	III	AI22C12	Deep Learning	CC	5	73	2	3	50	50	100	3
	III	AI22CP09	Deep Learning Lab	CC	5	75	-	3	25	25	50*	3
	III	AI22CP10	Full Stack Development Lab	CC	5	75	-	3	25	25	50*	3
	III	AI21PROJ	Project and Viva-Voce	CC	7	-	-	-	50	50	100	5
	IV	AI21SBCE /AI22SBP4	IBM Applied AI / Data Analytics Tools	SEC	3	45 /41	-/ 4	-	100	-	100	3
	III	AI21AC3/ AP16AC4	**ALC :** AI for Analytics / Internet of Things	ACC	SS	-	-	3	25	75	100	5
I-V	VI	16BONL1/ 16BONL2/	Online Course 1 Online Course 2	ACC	-	-	-	-	-	-	-	-
I-VI										**Total**	**4100**	**140**

CC : Core Course CA : Continuous Assessment

SEC : Skill Enhancement Course ESE : End Semester Examination

ACC-Advanced Learner Course ALC- Advanced Learner Course

SS – Self Study

*CA conducted for 50 converted to 25, ESE conducted for 100 converted to 25.

QUESTION PAPER PATTERN

CORE & ALLIED PAPERS

Continuous Internal Assessment: 50 Marks (Semester I & II)

SECTION	MARKS	TOTAL
A – 4 X 2 Marks (No Choice)	**08**	50
B – 4 X 6 Marks (No Choice)	**24**	
C - 2 X 9 Marks (Internal Choice at same CLO Level)	**18**	

End Semester Examination: 100 Marks (Semester I & II)

SECTION	**WORD LIMIT**	**MARKS**	**TOTAL**
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	100
B -5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5x 12 Marks (Internal Choice at same CLO Level)	600-800	60	

CA Question Paper Pattern and distribution of marks UG Core and Allied - (First 3 Units)

Question from each unit comprising of (Semester III & IV)

SECTION	**MARKS**	**TOTAL**
A – 3 X 2 Marks (No Choice)	06	60
B – 3 X 6 Marks (Internal Choice at the same CLO level)	15	
C - 3 X 12 Marks (Internal Choice at the same CLO level)	36	

End Semester Examination: 5 x 20 = 100 Marks (Semester III & IV)

SECTION	**WORD LIMIT**	**MARKS**	**TOTAL**
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	**100**
B – 5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5 x 12Marks (Internal Choice at same CLO Level)	600-800	60	

CA Question Paper Pattern and distribution of marks UG Core and Allied - (First 3 Units)Question from each unit comprising of (Semester V & VI)

SECTION	MARKS	TOTAL
A – 3 X 2 Marks (No Choice)	06	60
B – 3 X 6 Marks (Internal Choice at the same CLO level)	15	
C - 3 X 12 Marks (Internal Choice at the same CLO level)	36	

End Semester Examination: 5 x 20 = 100 Marks (Semester V & VI)

SECTION	WORD LIMIT	MARKS	TOTAL
A - 5 x 2 Marks (No Choice)	One or Two Sentences	10	**100**
B – 5 x 6 Marks (Internal Choice at same CLO Level)	300	30	
C – 5 x 12Marks (Internal Choice at same CLO Level)	600-800	60	

ADVANCED LEARNERS COURSE (ALC)

Continuous Internal Assessment: 25 Marks

SECTION		MARKS	TOTAL
A	4 / 6 X 4 Marks	16	25
B	1 / 2 X 9 Marks	9	

End Semester Examination: 75 Marks

SECTION		MARKS	TOTAL
A	5 / 8 X 5 Marks	25	75
B	5/8 X 10 Marks	50	

VALUE EDUCATION.AND HUMAN RIGHTS / ENTREPRENEURSHIP / DESIGN THINKING

QUIZ	ASSIGNMENT	PROJECT / CASE STUDY	TOTAL
50 Marks	25 Marks	25 Marks	100 Marks

CYBER SECURITY I

QUIZ	CASE STUDY	POSTER
60 Marks	20 Marks	20 Marks

FIELD TRAINING

The students have the option to select any organization – Government / private like industry, R & D organizations, scientific companies, etc., in consultation with the staff coordinator and HoD. The students are to undergo training for a period of two weeks at the end of semester IV during vacation. The students must maintain a work diary and prepare report of the training undergone and submit the same to the HoD. On a stipulated date, there will be a viva- voce with internal examiners at the beginning of the semester V.

MODE OF EVALUATION	MARKS	TOTAL
Attendance	10	100
Work Diary	15	
Report	50	
Viva-voce	25	

PROJECT

Individual Project and Viva Voce

Each Individual (UG) or group (UG) comprising of 5 members will be allotted to a staff co-coordinator. A specific problem will be assigned to the students or they will be asked to choose a problem/area of their interest. The topic/area of work will be finalized at the end of IV semester, allowing scope for the students to gather relevant literature during the vacation. The research work can be carried at the college or any organization approved by the staff Coordinator and the HoD. Viva Voce/presentation will be conducted by a panel internal examiners including of HoD and the staff coordinator guiding the project. A PowerPoint presentation by the group before the audience will be evaluated on the basis of student's response to the questions.

Internal Assessment: 50 Marks

Review	Mode of Evaluation	Marks	Total
I	Selection of the field of study, Topic & Literature Collection	15	50
II	Research Design and Data Collection	15	
III	Analysis & Conclusion, Preparation of rough draft	20	

External Assessment: 50 Marks

Mode of Evaluation	Marks	Total
Project Report		
Evaluation of the project	30	50
Viva Voce	20	

WEIGHTAGE ASSIGNED TO VARIOUS COMPONENTS OF CONTINUOUS INTERNAL ASSESSMENT (Semesters I - II)

Theory

	CIA I	CIA II	Model Exam	Assignment / Class Notes	Seminar	Quiz	Participation	Application of Knowledge, Innovation & Creativity	Attendance	Max. Marks
Core / Allied	7	7	10	4	5	4	5	5	3	50
SBS	5	5	15	-	-	-	-		-	25

CONTINUOUS INTERNAL ASSESSMENT (Semesters III to VI)
Theory

	CIA	Model Exam	Seminar / Assignment/ Quiz	Class Participation	Attendance	Max. Marks
Core / Allied	10	20	10	7	3	50

Practical

	Model Exam	**Lab Performance**	**Regularity in Record Submission**	**Attendance**	**Maximum Marks**
Core / Allied	15	24	8	3	50

SKILL BASED SUBJECT PRACTICAL – [100 MARKS]

Test 1 (Theory / Practical)	: 50 marks
Test 2 (Theory / Practical / Project)	: 50 marks
Total	: 100 Marks

*Departments can plan the above pattern according to their course as Test 1 & 2 - Theory / one theory and one practical / both as practical / one theory or practical with one project.

RUBRICS Assignment/ Quiz / Seminar

Maximum - 20 Marks (converted to 4 marks)

Criteria	4 Marks	3 Marks	2 Marks	1 Mark
Focus Purpose	Clear	Shows awareness	Shows little awareness	No awareness
Main idea	Clearly presents a main idea.	Main idea supported throughout	Vague sense	No main idea
Organization: Overall	Well planned	Good overall organization	There is a sense of organization	No sense of organization
Content	Exceptionally well presented	Well presented	Content is sound	Not good
Style: Details and Examples	Large amounts of specific examples and detailed description	Some use of examples and detailed descriptions	Little use of specific examples and details	No use of examples

CLASS PARTICIPATION

Maximum - 20 Marks (Converted to 5 marks)

Criteria	5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Points scored
Level of Engagement in Class	Student proactively contributes to class by offering ideas and asks questions more than once per class.	Student proactively contributes to class by offering ideas and asks questions once per class	Student contributes to class and asks questions occasionally	Student rarely contributes to class by offering ideas and asking no questions	Student never contributes to class by offering ideas	
Listening Skills	Student listens when others talk, both in groups and in class. Student incorporates or builds off of the ideas of others.	Student listens when others talk, both in groups and in class.	Student listens when others talk in groups and in class occasionally	Student does not listen when others talk, both in groups and in class.	Student does not listen when others talk, both in groups and in class. Student often interrupts when others speak.	
Behavior	Student almost never displays disruptive behavior during class	Student rarely displays disruptive behavior during class	Student occasionally displays disruptive behavior during class	Student often displays disruptive behavior during class	Student almost always displays disruptive behavior during class	
Preparation	Student is almost always prepared for class with required class materials	Student is usually prepared for class with required class materials	Student is occasionally prepared for class with required class materials	Student is rarely prepared for class with required class materials	Student is almost never prepared for class.	
					Total	

MAPPING OF PLOs WITH CLOs

COURSE	PROGRAMME LEARNING OUTCOMES					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
COURSE- AI22C01						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – PC22C02						
CLO1	M	S	S	S	S	S
CLO2	S	S	S	M	M	S
CLO3	S	M	S	S	S	S
CLO4	S	S	M	S	S	S
COURSE - AI22CP1						
CLO1	M	M	S	S	L	L
CLO2	M	M	S	M	M	S
CLO3	S	M	M	S	S	M
CLO4	M	M	S	S	L	S
COURSE - AI22C03						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22CP2						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22CP3						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

COURSE - AP22C04						
CLO1	M	M	S	S	S	L
CLO2	S	S	S	S	S	L
CLO3	S	S	S	S	S	L
CLO4	S	S	M	S	S	M
COURSE - AI22C05						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22CP4						
CLO1	M	S	S	S	S	L
CLO2	S	M	S	M	S	L
CLO3	S	S	M	S	S	L
CLO4	M	S	S	S	M	S
COURSE - AI22SBP1						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22C06						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22C07						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22CP5						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L

CLO4	S	S	S	M	L	L
COURSE - AI22CP6						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AI22SBP2						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE - AP22A01						
CLO1	S	M	S	S	S	L
CLO2	S	S	M	S	M	L
CLO3	S	S	S	M	M	L
CLO4	S	S	S	M	S	L
COURSE - CS22A02						
CLO1	S	M	S	S	S	L
CLO2	S	S	M	S	M	L
CLO3	S	S	S	S	M	L
CLO4	S	S	S	M	S	L
COURSE - AP22A03						
CLO1	S	S	S	M	S	L
CLO2	M	M	S	M	S	L
CLO3	M	S	S	S	S	L
CLO4	S	S	S	M	S	L
COURSE – AI22C08						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI22C09						
CLO1	S	S	S	M	M	L
CLO2	S	S	S	S	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	S	L	M

COURSE – AI22C10						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI21E01						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI22E02						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI22E03						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI22CP7						
CLO1	S	S	M	M	L	M
CLO2	S	S	M	S	M	L
CLO3	S	S	M	M	L	L
CLO4	S	S	M	S	L	L
COURSE – AI22CP8						
CLO1	S	S	M	M	L	M
CLO2	S	S	M	S	M	L
CLO3	S	S	M	M	L	L
CLO4	S	S	M	S	L	L
COURSE – AI21AC1						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI21AC2						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

COURSE – AI22C11						
CLO1	S	S	S	M	S	L
CLO2	M	M	S	M	S	L
CLO3	M	S	S	S	S	L
CLO4	S	S	S	M	S	L
COURSE – AI22C12						
CLO1	M	S	S	S	S	S
CLO2	S	S	S	M	M	S
CLO3	S	M	S	S	S	S
CLO4	S	S	M	S	S	S
COURSE – AI22CP9						
CLO1	M	S	S	S	S	L
CLO2	S	M	S	M	S	L
CLO3	S	S	M	S	S	L
CLO4	M	S	S	S	M	S
COURSE – AI22CP10						
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L
COURSE – AI21SBCE						
CLO1	M	S	S	S	S	S
CLO2	S	S	S	M	M	S
CLO3	S	M	S	S	S	S
CLO4	S	S	M	S	S	S
COURSE – AI21AC3						
CLO1	M	S	S	S	S	L
CLO2	S	M	S	M	S	L
CLO3	S	S	M	S	S	L
CLO4	M	S	S	S	M	S
COURSE – AP16AC4						
CLO1	M	S	S	S	S	L
CLO2	S	M	S	M	S	L
CLO3	S	S	M	S	S	L
CLO4	M	S	S	S	M	S

SEMESTER I

Course Number	Course Name	Category	L	T	P	Credit
AI22C01	**OBJECT ORIENTED PROGRAMMING**	**III**	**56**	**4**	**-**	**3**

Preamble

This course introduces object-oriented programming concepts and also java programming. It covers the concept of loops, arrays, input/output structures, events, exceptions and threads using Java.

Prerequisite

- Programming Language
- Basics of computers

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the principles of object-oriented programming, Java language syntax and semantics	K1
CLO2	Understand the concepts of object-oriented programming and java	K2
CLO3	Apply the principles of inheritance, packages and interfaces in simple java applications	K3
CLO4	Analyze the working features of java language	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

OBJECT ORIENTED PROGRAMMING-(AI22C01) – [56 Hrs]

UNIT I: (11 Hrs.)

Fundamentals of Object-Oriented Programming: Object-Oriented Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of Object-Oriented Programming, Application of Object- Oriented Programming. Java Evolution: History, Features, Comparison of Java with C and C++. Java

and Internet, Java and World Wide Web, Web Browsers. Overview of Java: Simple Java program, Structure, Java Tokens, Statements, Java Virtual Machine.

UNIT II: (12 Hrs.)

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: if, if...Else, nested if, switch, ?: operator. Decision Making and Looping: while, do, for –Labelled loops.

UNIT III: (11 Hrs.)

Classes, Objects and Methods - Arrays, Strings – Interfaces: Multiple Inheritance – Packages: Putting Classes together.

UNIT IV: (11 Hrs.)

Multithreaded Programming - Managing Errors and Exceptions – Applet Programming: Introduction, how Applet differ from Applications, preparing to write Applets, Building Applet code, Applet Lifecycle.

UNIT V: (11 Hrs.

Graphics Programming - Managing Input/output Files in Java: Concepts of Streams, Stream Classes, Byte Stream classes, Character stream classes, Using streams, I/O Classes, File Class, I/O exceptions, Creation of files, Reading / Writing characters, Byte-Handling Primitive data Types, Random Access Files.

Text Book:

E. Balaguruswamy, Programming with JAVA – A Primer, Mc-Graw Hill Professional, 2015.

Reference Books:

1. R.G. Dromey, "How to solve it by Computer", Pearson Education, 2008.
2. Walter Savitch, Java: An Introduction to Problem Solving and Programming, Eighth Edition, Pearson Education Ltd, 2019.
3. Core Java Volume I—Fundamentals, Cay.S.Horstmann, 11th Edition, 2018, Pearson Education
4. Herbert Schildt - Java: A Beginner's Guide, 8th Edition, McGraw Hill Education, 2018.

Pedagogy
Lectures, Case Studies, Demonstrations

Course Designers

1. A. Sheela Rini
2. Dr. J. Athena

Course Number	Course Name	Category	L	T	P	Credit
PC22C02	COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM SOLVING	III	45	-	-	3

Preamble

This course aims to kindle the young minds to think like a computer scientist, with the idea that Computing and computers will enable the spread of computational thinking. Computational thinking is thinking recursively, reformulating a seemingly difficult problem into one which we know how to solve and taking an approach to solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the basic principles of logical reasoning, problem solving in computational thinking	K1
CLO2	Understanding the applications of propositional logic, problem representation and techniques	K2
CLO3	Apply algorithmic thinking to problem solving using tools	K3
CLO4	Apply and analyze to solve domain specific problems using computational thinking concepts	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	S	S	S	S	S
CLO2	S	S	S	M	M	S
CLO3	S	M	S	S	S	S
CLO4	S	S	M	S	S	S

S - Strong; M - Medium; L – Low

COMPUTATIONAL AND ALGORITHMIC THINKING

FOR PROBLEM SOLVING - (PC22C02) – [45 Hrs]

Unit I **(7 Hrs.)**

Basics: Introduction to Computational Thinking- Data Logic - History of Computational Thinking- Applications of Computational Thinking.

Unit II **(8 Hrs.)**

Data- Information and Data - Data Encoding - Logic - Boolean logic - Applications of simple Propositional Logic. Tool: Flow algorithm and Scratch.

Unit III **(10 Hrs.)**

Problem Solving and Algorithmic Thinking: Problem definition- Logical reasoning- Problem decomposition- Abstraction- Problem representation via Algorithmic thinking: Name binding- Selection- Repetition and Control Abstraction- Simple Algorithms – Comparison of performance of Algorithms.

Unit IV **(8 Hrs.)**

Activities in Class: Sudoku -Towers of Hanoi- Graph Coloring - Geographical Map reading- Poem reading - Novel reading - Data analysis on news.

Unit V **(12 Hrs.)**

Problem Solving Techniques- Factoring and Recursion Techniques- Greedy Techniques-Divide and Conquer- Search and Sort Algorithms- Text Processing and Pattern matching. Tool: iPython

Text Books

1. David Riley and Kenny Hunt (2014), Computational Thinking for Modern Solver, Chapman & Hall/CRC.
2. Paolo Ferragina, FabrizioLuccio (2018), Computational Thinking First Algorithms, Springer.
3. Karl Beecher (2017), Computational Thinking – A beginner's guide to problem solving, BSC publication

Pedagogy

Lectures, Group discussions, Demonstrations, Case studies

Course Designers

1. Dr..M.Sasikala
2. Mrs. V. Mageshwari

Evaluation pattern

ASSESSMENT	NUMBER	MARKS
Quiz (online or offline)	5	50
Class Activity	5	25
Group Project (Domain Specific)	1	25
TOTAL		100

Course Number	Course Name	Category	L	T	P	Credit
AI22CP1	OBJECT ORIENTED PROGRAMMING LAB	III	-	-	45	3

Preamble

This course provides hands-on training to implement Object Oriented programming concept using basic syntaxes of control Structures, strings and functions It demonstrates inheritance, interfaces and packages It also explores different exception handling mechanisms and concept of multithreading.

Prerequisite

1. Basics of programming
2. Object oriented principles

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the logic for the given problem, recognize and understand the syntax and construct JAVA code	K1
CLO2	Understand the java programming constructs and methods	K2
CLO3	Apply OOPs concepts and implement java programs	K3
CLO4	Analyse and implement advanced java programming techniques	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	S	L	L
CLO2	M	M	S	M	M	S
CLO3	S	M	M	S	S	M
CLO4	M	M	S	S	L	S

S- Strong; M-Medium; L-Low

OBJECT ORIENTED PROGRAMMING LAB – (AI22CP1) – 45 Hrs

List of Exercises:

1. Exercises using classes and objects
2. Exercises using control statements
3. Exercises using different inheritance
4. Exercises using interfaces
5. Exercises using packages
6. Exercises using string functions
7. Exercises using mouse events
8. Exercises using thread methods
9. Exercises to implement Exception Handling

Pedagogy

Demonstrations

Course Designers

1. Ms. A. SheelaRini
2. Dr. J. Athena

SEMESTER II

Course Number	Course Name	Category	L	T	P	Credit
AI22C03	**DATA SCIENCE AND PYTHON**	**III**	**56**	**4**	**-**	**3**

Preamble

This course introduces the concepts of programming in Python and Data Science. It also provides various steps involved in the data science process and core python with advanced concepts like regular expressions, exception handling, multithreading and data base programming.

Prerequisites

Problem Solving and Programming

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic programming elements and methods related to the data science	K1
CLO2	Understand the concepts of Python Programming such as lists, tuples and dictionary	K2
CLO3	Apply the functions of the python programming to solve the problems.	K3
CLO4	Analyze the library functions for various modules	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

DATA SCIENCE AND PYTHON –(AI22C03) – 56 Hrs

UNIT – I (10 Hrs.)

Data Science: Introduction – Benefits and Uses of Data Science – Facets of Data – Big Data ecosystem and data science. Data Science Process: Overview of Data Science Process – Steps in Data Science Process.

UNIT – II **(12 Hrs.)**

Python – origins – features. Python basics: statement and syntax Identifiers- variable and assignment – Identifiers- Basic style guidelines- Memory Management- Related Module and Developer Tools – Python objects: Standard types and other built in type internal types – Standard type operators – Standard type built-in functions. Numbers – Introduction to Numbers – Integers – Double precision floating point numbers Complex numbers – Operators- Numeric type functions.

UNIT – III **(11 Hrs.)**

Sequences-Strings-Strings and Operators- String built-in methods- Lists and Tuples – List type Built in Methods – Tuples Operator and Build in Functions. Mapping type: Dictionaries – Mapping typeoperators – Mapping type Built-in and Factory Functions - Mapping type built in methods. Dictionary Keys- Set types and operators. Conditionals and loops – if statement – else Statement – elif statement – conditional expression – while statement – for statement – break statement – continue statement – pass statement – Iterators and the iter( ) function.

UNIT – IV **(12 Hrs.)**

Functions and Functional Programming – Functions – calling functions – creating functions – passing functions – Built-in Functions: apply( ), filter( ), map( ) and reduce( ) - Modules – Modules and Files – Modules built-in functions - classes – class attributes – Instances.

UNIT – V **(11 Hrs.)**

Regular expressions – Files & I/O: File objects – Built in Functions – Methods – Built in Attributes – Standard files – Command line arguments – File System – File Execution –Database Programming – Introduction - Basic Database Operations and SQL - Example of using Database Adapters, MySQL

Text Books

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali (2016). Introducing Data Science, Dreamtech Press, New Delhi
2. Wesley J.Chun (2012). Core Python Programming, Pearson Education Publication,United States.

Reference Books

1. Mark Lutz (2018). Programming Python, 4/e, O'Reilly Media.
2. Mark Summerfield (2009), Programming in Python 3, Pearson Education.
3. Wesley J.Chun (2016). Core Python Programming Application Programming, 3/e, Pearson Education Publication,United States

Pedagogy: Demonstration, Lectures, Group Discussion

Course Designers

1. Ms. R. Kowsalya
2. Dr. M. Sasikala

Course Number	Course Name	Category	L	T	P	Credit
AI22CP2	PYTHON LAB	III	-	-	45	3

Preamble

This course provides exercises in core python, advanced concepts like regular expressions, exception handling, multithreading, web programming and data base programming using Python IDE like Jupiter/spider. It also covers exploratory data analysis using the packages like numpy, pandas, matplotlib.

Prerequisites

Problem Solving and Programming

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic elements, concepts and modules of python programming and data analysis	K1
CLO2	Understand the python constructs to develop programs	K2
CLO3	Apply appropriate techniques in Python to create simple applications	K3
CLO4	Analyze python packages and modules suitable for real time applications	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

PYTHON LAB – (AI22CP2) – 45 Hrs

List of Exercises:

1. Exercises using strings, conditional loops, functions.
2. Exercises using regular expression and dictionary
3. Exercises using Lists and Tuples.
4. Exercises using database connectivity
5. Exercises using Files
6. Exercises to implement graphs and charts for exploratory data analysis
7. Exercises to implement statistical methods – Correlation, Regression
8. Exercises using plots for data visualization
9. Exercises to implement data pre-processing techniques – Handling noisy data, missing values, data transformation
10. Exercises to implement outlier analysis

Pedagogy:

Demonstration, Lecture, Group Discussion

Course Designers

1. Dr. R. Kowsalya
2. Dr. M. Sasikala

Course Number	Course Name	Category	L	T	P	Credit
AI22CP3	**STATISTICAL ANALYSIS AND ADVANCED EXCEL LAB**	**III**	**-**	**-**	**45**	**2**

Preamble

This course provides hands on training in data analysis methods using statistical analysis software package PSPP. It also covers statistical methods in Excel to perform data analysis and forecasting.

Prerequisite

Basic statistics

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the excel operations like pivot tables, scenarios, goal seek, lookup and advanced filters	K1
CLO2	Understand the features of PSPP and the advanced features in excel	K2
CLO3	Apply the descriptive and inferential statistical techniques using PSPP and excel	K3
CLO4	Analyze and interpret various descriptive tests in PSPP to supplement decision making in business scenario	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

STATISTICAL ANALYSIS AND ADVANCED EXCEL LAB – (AI22CP3) – [45 Hrs]

List of Exercises:

1. Exercises using various statistical measures
2. Exercises to implement graphs and charts for exploratory data analysis
3. Exercises to implement correlation analysis using PSPP
4. Exercises to implement regression analysis using PSPP
5. Exercises to implement T-test, F-test, Chi-square test using PSPP
6. Exercises to implement ANOVA using PSPP
7. Exercises to implement Advanced Filters in Excel
8. Exercises to implement Data Validation in Excel
9. Exercises to implement Scenarios, Goal seek
10. Exercises to implement Vlookup, Hlookup in Excel
11. Exercises to implement Pivot Tables and Pivot Charts in Excel
12. Exercises to implement Timeline using Gantt chart
13. Exercises to implement Macros in Excel
14. Exercises to implement Dashboards in Excel

Pedagogy

Demonstrations

Course Designers

1. Dr. M.S. Vijaya
2. Dr. M. Sasikala

SEMESTER III

Course Number	Course Name	Category	L	T	P	Credit
AP22C04	**OPERATING SYSTEMS FUNDAMENTALS - LINUX**	**III**	**58**	**2**	**-**	**3**

Preamble

This subject is designed to provide the students with a thorough discussion of the fundamentals of operating systems. To explore the various memory management scheme and to perform administrative tasks on LINUX servers.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts with functions of operatingsystems and Linux systems.	K1
CLO2	Understand the operating systems objectives and functionality along with system programs and system calls.	K2
CLO3	Compare and contrast various memory management schemes.	K2
CLO4	Demonstrate deadlock, prevention and avoidance algorithms, storage management, various scheduling algorithms, and shell programming.	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	S	S	L
CLO2	S	S	S	S	S	L
CLO3	S	S	S	S	S	L
CLO4	S	S	M	S	S	M

S- Strong; M-Medium; L-Low

OPERATING SYSTEMS FUNDAMENTALS – LINUX (AP22C04) – [58 Hrs]

UNIT I **(12 Hrs)**

Introduction: What operating systems do - **Computer System Architecture- Operating SystemOperations.** Process Management: **Process Concept**-Process Scheduling- Operations on Processes- Interprocess communication.

UNIT II **(12 Hrs)**

Process Scheduling: **Basic Concepts - Preemptive and Non-preemptive Scheduling**-Scheduling Criteria. Scheduling Algorithms (FCFS, SJF & Round Robin only). Synchronization: **Background** - The Critical Section Problem - Peterson's Solution – Semaphores - The Dining Philosopher's Problem. Deadlock: **Deadlock Characterization** - Methods Handling Deadlocks - Recovery from Deadlock.

UNIT III **(11 Hrs)**

Memory Management Strategies: **Background - Contiguous Memory Allocation -** Paging- Basic Method. Virtual Memory Management: Demand Paging-Page Replacement - Basic Page Replacement, **FIFO Page Replacement**, Optimal Page Replacement, LRU Page Replacement, Counting-Based Page Replacement.

UNIT IV **(11 Hrs)**

What Linux Is – Becoming a Linux Power User: About Shells and Terminal Windows- Choosing your shell - **Running Commands - Recalling Commands Using Command History**-Connecting and Expanding Commands-Using Shell Variables.

UNIT V **(12 Hrs)**

Moving Around the File System: Using Basic File System Commands - Using Meta characters and Operators-**Listing Files and Directories**-Understanding File Permissions and Ownership-Moving, Copying, and Removing Files.

Text Books

1. Abraham Silberschatz, Peter Baer Galvin, G Gagne, OPERATING SYSTEM CONCEPTS, Wiley Publishers, 10th Edition, 2018.
2. Christopher Negus, LINUX BIBLE, Wiley,10th Edition 2020.

Reference Books

1. Archer J harries, Operating System, Tata Mc Graw Hill 2nd Edition, 2011.
2. Williams E. Shotts, The Linux Command Line: A Complete Introduction, John Wiley & Sons, 2nd Edition, 2019.
3. Jason Cannon, Linux for Beginners, Create space Independent Pub, 2014.

Pedagogy:

Lectures, Discussion, Quiz, PPT

Course Designers

1. Mrs. S.Mohanapriya
2. Mrs. T.S. Anushya Devi
3. Dr.R.Hepziba Gnanamalar

Course Number	Course Name	Category	L	T	P	Credit
AI22C05	**DATA STRUCTURES**	**III**	**58**	**2**	**-**	**3**

Preamble

This course covers various data structures, including arrays, structures, stacks, queues, linked lists and trees. It also includes sorting and searching techniques.

Prerequisite

- Programming
- Operating System

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO 1	Remember primitive and non-primitive data structures and their operations	K1
CLO 2	Understand the principles and operations of various data structures	K2
CLO 3	Apply the techniques and algorithms of data structures in solving simple tasks	K3
CLO 4	Analyze data structures algorithms suitable for appropriate applications	K4

Mapping with Programming Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

DATA STRUCTURES (AI22C05) – [58 Hrs]

UNIT-I **(12 Hrs.)**

Introduction and Overview: - Introduction - Basic Terminology: Elementary Data Organization - Data Structures - Data structure operations - Algorithms: Complexity, Time-Space Trade-off. Preliminaries: Algorithmic Notation - **Control Structures, Variables, Data Types. Arrays, Records**, and Pointers: Introduction - Linear Arrays - Representation of Linear Arrays in Memory - Traversing Linear Arrays - Inserting and Deleting.

UNIT-II **(11 Hrs.)**

Linked Lists: Introduction - Linked Lists - **Representation of Linked Lists in Memory**-Traversing a Linked List – Searching a Linked List- **Memory Allocation-Garbage Collection** – Insertion into a Linked List-Deletion from a Linked List.

UNIT-III **(11 Hrs.)**

Stack, Queues, Recursion: Introduction – Stacks - Array Representation of Stacks -Linked Representation of Stacks - **Arithmetic Expressions - Polish Notation** - Recursion-**Towers of Hanoi** - Implementation of Recursive Procedures by Stacks – Queues - Linked Representation of Queues – Dequeue - Priority Queues.

UNIT-IV **(12 Hrs.)**

Trees: Introduction - Binary Trees - Representing Binary Trees in Memory-Traversing binary trees-**Binary search Trees-Searching**-Inserting-Deleting in a Binary Search Trees-Graphs: **Terminology–Sequential Representation of Graphs**-Adjacency Matrix, Path Matrix**.**

UNIT-V **(12 Hrs.)**

Sorting and Searching: Introduction – Sorting – Bubble Sort-Insertion Sort - Selection Sort - Merging - **Merge Sort - Radix Sort - Searching and Data Modification** –Searching: Linear Search - Binary Search.

TEXTBOOK

1. Seymour Lipschutz, Data Structures Tata McGraw Hill Company, Revised First Edition, Tenth Reprinted 2017

REFERENCE BOOKS

1. Ellis Horowitz, SartajSahni, Fundamentals of Data Structures,Galgotia Book Source, 2003, Reprinted 2014.
2. K.Sharma, Data Structures using C, Pearson education 2014.
3. Rajdew Tiwari and Nagesh Sharma, Design and Analysis of Algorithms, Pearson education 2014.

PEDAGOGY

Lectures**,** Demonstrations, Discussions

COURSE DESIGNERS

3. Dr. J. Athena
4. Ms. A. Sheela Rini

Course Number	Course Name	Category	L	T	P	Credit
AI22CP4	DBMS LAB	III	-	-	75	4

Preamble

The lab course provides a way to explore storing and accessing data in a database through query languages and PL/SQL programming language. It enables one to learn database functionality on real-time projects.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand basic SQL query statements	K2
CLO2	Gain knowledge of primary and foreign key constraints	K2
CLO3	Apply functions and joins to data	K3
CLO4	Demonstrate PL/SQL programming on databases and differentiate Key/value store databases from a relational database	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	S	S	S	S	L
CLO2	S	M	S	M	S	L
CLO3	S	S	M	S	S	L
CLO4	M	S	S	S	M	S

S- Strong; M-Medium; L-Low.

DBMS LAB (AI22CP4) – [75 Hrs]

LIST OF EXERCISES:

1. A Case study and formulate the problem statement on a specific project.
2. Draw ER Diagrams with entities, attributes, keys, and relationships between entities, and cardinalities.
3. Draw tables with Normalization
4. Perform Data Definition Language statements (Create, Alter, Drop, Truncate, Rename)
5. Perform Data Manipulation Language statements (Select, Insert, Update, Delete)
6. Perform Transaction Control Language and Data Control Language statements (Grant, Revoke, Commit, Rollback, Savepoint)
7. Perform Data Integrity Constraints Operations (Primary key, Foreign key, Not null, Unique, Check)
8. Perform Aggregate Function and Sorting
9. Perform Joins Operations
10. Implement Sub Queries
11. Write PL/SQL program to perform Function
12. Write PL/SQL program to perform Procedure
13. Write a program to perform Triggers in PL/SQL
14. Write a program to perform Cursor operation in PL/SQL

PEDAGOGY

Demonstrations of working environment / Tools / Software / Program

COURSE DESIGNERS

1. Dr. R. Hepziba Ganamalar

Course Number	Course Name	Category	L	T	P	Credit
AI22SBP1	SKILL-BASED SUBJECT 1: R PROGRAMMING LAB	III	41	4	-	3

Preamble

This course provides hands-on training in creating and manipulating various data objects in R. It also covers exercises to implement linear algebra concepts. It also deals with the implementation of basic statistical analysis and graphics programming.

Prerequisites

Programming concepts

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the elements in R programming and various constructs.	K1
CLO2	Understand the concepts and features of R Programming	K2
CLO3	Apply R programming in data analytics	K3
CLO4	Analyze various statistical methods of data analytics for simple applications	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

SKILL-BASED SUBJECT 1: R PROGRAMMING LAB (AI22SBP1) – [41 Hrs]

LIST OF EXERCISES:

1. Exercises to implement mathematical and string functions in R
2. Exercises to implement control structures in R
3. Exercises to implement different data structures such as vectors, lists, data frames, arrays, factors
4. Exercises to implement linear algebra concepts such as matrix operations, eigen values, and eigen vectors using R
5. Exercises to implement basic statistical concepts like measures of central tendency, measures of dispersion using R
6. Exercises to implement correlation and regression analysis using R
7. Exercises to create various charts and graphs such as scatter plots, box plots, bar plots, histograms, line plots density plots using R

PEDAGOGY

Demonstrations

COURSE DESIGNERS

1. Dr. M. S. Vijaya
2. Dr. M. Sasikala

SEMESTER IV

Course Number	Course Name	Category	L	T	P	Credit
AI22C06	BIG DATA FRAMEWORK	III	58	2	-	3

PREAMBLE

This course introduces big data tools, techniques and Hadoop ecosystem. It also includes the concepts of Map Reduce, PIG, Spark and Hive.

PREREQUISITES

- Database management systems
- Data mining

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the big data tools, techniques and Hadoop components	K1
CLO2	Understand the architectures of big data framework in processing big data	K2
CLO3	Apply big data tools and techniques to solve big data problems	K3
CLO4	Analyze various big data models suitable for handling different types of big data	K4

MAPPING WITH PROGRAMME OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

BIG DATA FRAMEWORK (AI22C06) – [58 Hrs]

UNIT I **(12 Hrs)**

Big Data: Big Data Overview, Evolution of Big Data, Definition of Big Data, Challenges with Big Data- State of practice in Analytics, Key roles for new Big Data Ecosystem, Data Analytics Lifecycle overview, discovery, data preparation, model planning, model building, communicate results, operationalize.

UNIT II **(12 Hrs)**

HDFS: The design of HDFS, HDFS concepts, HDFS federation, The command line interface- Hadoop file systems. **The Hadoop Eco System:** Pig, Hive, Hbase, Mahout. **Hadoop operations:** Setting up a Hadoop cluster- **cluster specification, cluster setup and installation**- Hadoop configuration.

UNIT III **(12 Hrs)**

MapReduce: Introduction- Anatomy of a MapReduce Job Run- Failures- Shuffle and Sort. **MapReduce types and formats: Types – Input formats – output formats. MapReduce Features:** Counters- Sorting- Joins.

UNIT IV **(11 Hrs)**

Spark: Installing Spark – examples –Spark Philosophy - History of Spark - Running Spark- **Spark Architecture** - **Data Frames** - Transformations - End to end example –Spark Toolset - Spark run on cluster - Developing spark Applications - Deploying Spark.

UNIT V **(11 Hrs)**

Hive: Introduction- Installing Hive – Running Hive- Comparison with traditional databases- HiveQL- Tables - User Defined functions.

TEXT BOOKS:

Tom White, ―Hadoop: The Definitive Guide‖, O`Reilly Publishers, USA, 2015

REFERENCE BOOKS:

1. EMC Education Services, ―Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data‖, John Wiley & Sons, New Delhi, 2015.
2. Bill Chambers and Matei Zaharia. "Spark: The Definitive Guide", O'Reilly Media, 2018.

PEDAGOGY:

Lectures, Demonstrations, Group discussions

COURSE DESIGNERS

1. Dr. R.Suriyagrace
2. Mrs. T.Prabhakumari

Course Number	Course Name	Category	L	T	P	Credit
AI22C07	DATA MINING	III	43	2	-	3

PREAMBLE

This course introduces basic concepts of data mining. It includes techniques like classification, clustering, association rule mining. The course covers various applications of data mining and its tools.

PREREQUISITE

- Database concepts
- Statistics

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the concepts of data mining and its applications	K1
CLO2	Understand the techniques and algorithms of data mining	K2
CLO3	Apply data mining tasks on real-time datasets	K3
CLO4	Analyze various data mining algorithms for solving complex problems	K4

MAPPING WITH PROGRAMME OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

DATA MINING (AI22C07) – [43 Hrs]

UNIT I **(8 Hrs)**

Introduction: What is data mining? - An essential step in knowledge discovery - **Diversity of data types for data mining** - Mining various kinds of knowledge - Confluence of multiple disciplines - **Data Mining and Applications** - Data Mining and Society (Major Issues).

UNIT II **(9 Hrs)**

Data, Measurements and Data Preprocessing: **Data Types** - Statistics of Data: Measuring the Central Tendency and Dispersion of data, Covariance and Correlation - **Data Quality, Data Cleaning, and Data Integration** - Data Transformation. Pattern Mining: Frequent itemsets, closed itemsets, andassociation rules - Frequent itemset mining methods: Apriori algorithm, **Pattern-growth approach**, Mining frequent itemsets using the vertical data format.

UNIT III **(9 Hrs)**

Classification: **What is classification?, General approach to classification** - Decision Tree Induction - Bayes Classification Methods – K-nearest neighbor classifiers - Model Evaluation and Selection: Metrics for evaluating classifier performance, **Holdout method and random subsampling, crossvalidation, Bootstrap** - Techniques to improve classification accuracy (Ensemble Methods).

UNIT IV **(9 Hrs)**

Cluster Analysis: **Cluster Analysis** - Partitioning Methods - Hierarchical Methods: **Basic concepts of hierarchical clustering**, Agglomerative hierarchical clustering, and Divisive hierarchical clustering - Density-based methods: DBSCAN, DENCLUE - **Evaluation of Clustering**.

UNIT V **(8 Hrs)**

Data Mining trends and research frontiers: Mining rich data types - **Data Mining Applications - Case Studies**.

TEXT BOOK

1. Jiawei Han, Jian Pei, Hanghang Tong (2023), Data Mining: Concepts and Techniques, Fourth Edition, Morgan Kaufmann Publishers, San Francisco, Elsevier Inc. by RELX India Private Limited, ISBN: 978-0-12-811760-6.

REFERENCE BOOKS

1. Jiawei Han, Micheline Kamber, Jian Pei (2011), Data Mining Concepts and Techniques, 3/e, Morgan Kaufmann Publishers, San Francisco.
2. David Hand, Heikki Mannila and Padhraic Smyth (2001). Principles of Data Mining, Prentice Hall of India, New Delhi
3. Mark A. Hall, Ian H. Witten, Eibe Frank (2011). Data Mining: Practical Machine Learning Tools and Techniques, 3/e,Morgan Kaufmann Publishers, San Francisco
4. Arun K. Pujari (2001). Data Mining Techniques; Universities Press, Hyderabad
5. Soman KP (2005). Data mining from theory to practice,2/e, PHI Learning Pvt. Ltd., New Delhi

PEDAGOGY

Lectures, Case Studies, Demonstrations

COURSE DESIGNERS

1. Dr Reshmi. S
2. Mrs. K. Geethalakshmi

Course Number	Course Name	Category	L	T	P	Credit
AI22CP5	BIG DATA FRAMEWORK LAB	III	-	-	45	3

PREAMBLE

This course provides implementation of the Hadoop components like Hive and Spark. This course also provides various exercises to implement the components in the distributed environment through MapReduce programming.

PREREQUISITE

- Big data framework
- NoSQL concepts

COURSE LEARNING OUTCOMES

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the components of big data framework, tools and technologies for big data processing	K1
CLO2	Understand the techniques of bid data framework for solving big data problems	K2
CLO3	Apply concepts of big data models and tools to process simple tasks	K3
CLO4	Analyze various big data models suitable for handling different types of big data	K4

MAPPING WITH PROGRAMME OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

BIG DATA FRAMEWORK LAB (AI22CP5) – [45 Hrs]

LIST OF EXERCISES:

- Setting up a Hadoop environment
- Exercises to implement file management tasks like adding files, retrieving files, deleting files and directories using Hadoop
- Exercises to implement Map reduce program that mines weather data.
- Exercises to implement Hive Scripts to create, alter, drop databases, tables, views, functions and indexes.
- Exercises to implement HiveQL to sort, order, group, distribute and cluster.
- Exercises to implement partitioning and bucketing in Hive.
- Exercises to create joins, views and indexes in Hive.
- Exercises to implement simple processing tasks in Spark
- Exercises to implement basic operations in Spark SQL

PEDAGOGY:

Demonstrations

COURSE DESIGNERS

1. Dr. R.Suriyagrace
2. Mrs. T.Prabhakumari

Course Number	Course Name	Category	L	T	P	Credit
AI22CP6	DATA MINING LAB	III	-	-	45	2

PREAMBLE

This lab provides hands on training in implementing data mining techniques using Knime, Weka and Rapid Miner.

PREREQUISITE

- Data Mining
- Programming

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the data mining functionalities and concepts of machine learning	K1
CLO2	Understand different data mining techniques, algorithms and their usage in real time applications	K2
CLO3	Apply various data mining techniques and algorithms for solving real time problems	K3
CLO4	Analyze classification and clustering models to give solution for complex problems	K4

MAPPING WITH PROGRAMME OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

DATA MINING LAB (AI22CP6) – [45 Hrs]

LIST OF EXERCISES:

- Exercises to implement data cleaning and normalization techniques
- Exercises to implement feature extraction and feature selection techniques
- Exercises on frequent mining patterns
- Exercises on classification techniques
- Exercises to implement regression techniques
- Exercises on clustering techniques
- Exercises to implement time series data analysis

PEDAGOGY

Demonstration, Lecture, Group Discussion

COURSE DESIGNERS

1. Dr Reshmi. S
2. Mrs. K. Geethalakshmi

Course Number	Course Name	Category	L	T	P	Credit
AI22SBP2	SKILL BASED SUBJECT II: DATA VISUALIZATION TOOLS	III	-	4	41	3

PREAMBLE

This course deals with the exercises for visualizing the data using tools Tableau / Power BI

PREREQUISITE

- MS Excel
- Data base management systems

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of data visualization and features of Tableau / Power BI	K1
CLO2	Understand the concepts of exploratory data analysis and visualization in Tableau / Power BI	K2
CLO3	Apply the concepts of exploratory data analysis and data visualization for simple applications	K3
CLO4	Analyze visual presentations of data for effective communication.	K4

MAPPING WITH PROGRAMME OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

DATA VISUALIZATION TOOLS (AI22SBP2) – [41 Hrs]

LIST OF EXERCISES:

- Exercises to visualize pipeline with its relationship to other data analysis pipelines
- Exercises to implement different temporal data visualization techniques represented in time viz browser
- Exercises to implement use time bench, a data model and software library for visualization and visual analytics for time-oriented data
- Exercises to demonstrate visualizations for document collections data such as node graphs, theme river, calendar view

PEDAGOGY:

Demonstrations

COURSE DESIGNERS

1. Dr. D. Krithika Renuka
2. Dr. S. Meera

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22A01	DIGITAL MARKETING	III	58	2	-	3

PREAMBLE

This course provides an overall understanding of the various digital marketing platforms and tools available for creating an effective digital marketing strategy. It provides technical skills to design and develop an integrated digital marketing plan for an organization.

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the role of digital marketing in marketing strategy	K1
CLO2	Understand the key elements of a digital marketing strategy	K2
CLO3	Apply the role that social marketing plays in the digital marketing	K3
CLO4	Analyze common digital marketing tools such as SEO and Social media and apply conceptual frame works of digital marketing	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	S	S	S	L
CLO2	S	S	M	S	M	L
CLO3	S	S	S	M	M	L
CLO4	S	S	S	M	S	L

S- Strong; M-Medium; L-Low.

DIGITAL MARKETING (AP22A01) – [58 Hrs]

UNIT – I **(12 Hrs)**

Introduction to Digital Marketing: Introduction - Original and Development of Digital Marketing - Internet Users: Penetration and Kind of Internet Use - Digital Marketing strategy – Digital Advertising Marketing Plan - Ethical and legal of framework of Digital Marketing - Skills Required in Digital Marketing - Digital Advertising: Introduction - Concept of display advertising - Digital Metrics. Types of Digital Ad - Targeting in digital marketing - Challenges faced by display marketing.

UNIT – II **(11 Hrs)**

Search Engine Advertising: Introduction – Why pay for search advertising? – Understanding Ad Placement – Understanding Ad Ranks – Why is the Ad rank important? – Create your first AdCampaign – Google Ads Account – Best practices for creating effective Ads - Enhance your Ad Campaign – Performance Reports – E-Commerce

UNIT – III **(12 Hrs)**

Face book Marketing : Introduction – Organic Marketing – Paid Marketing – Facebook Insights LinkedIn: Introduction - LinkedIn Strategy - Content Strategy - LinkedIn Native Videos - LinkedIn Analytics - Asset Copying - LinkedIn Sales Navigator - Emerging Platforms: Instagram

UNIT – IV **(12 Hrs)**

Search Engine Optimization: Introduction – Search Engine – The Concept of SEO – SEO Phases – Website Audit – Content – Social Media Reach – Maintenance – Local Search SEO – SEO Visual Search – Voice Change will change the SEO Industry – Sub domains vs Subfolders – Website

UNIT – V **(11 Hrs)**

Mobile Marketing: Introduction – Mobile Advertising – Mobile Marketing Toolkit – Mobile Marketing Features – Mobile Analytics. Digital Analytics: Introduction – Data Collection – Key Metrics – Experience Analysis – Making Web Analytics Actionable – Types of Tracking Code – Competitive Intelligence.

TEXT BOOK

1. Seema Gupta, Digital Marketing, McGraw Hill Education, 2nd Edition, 2018

REFERENCE BOOKS

1. Simon Kingsnorth, Digital Marketing Strategy: An Integrated Approach to Online Marketing, Kogan Page, 2nd Edition, 2019
2. Dave Chaffey, Digital Marketing, Pearson, 7th Edition, 2019
3. Stephanie Diamond, Digital Marketing All-in- One for Dummies, For Dummies, 1st Edition, 2019
4. Kevin Hartman, Digital Marketing Analytics: In Theory and In Practice, Ostmen Bennett Bridge Publishing Services, 2nd Edition, 2020.

PEDAGOGY

Lectures, Group discussions, Demonstrations, Case studies

COURSE DESIGNER

1. Mrs. M . Selvanayaki
2. Dr.R.Hepziba Gnanamalar

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CS22A02	M-COMMERCE	III	58	2	-	3

Preamble

This course provides an insight on M-Commerce principles and business models. It alsoexplores the concept of mobile commerce technologies, applications, mobile payment methods,security, and ethics.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental concept of E- commerce and process of business models	K1
CLO2	Understand the architecture and applications of M- Commerce	K2
CLO3	Illustrate the risks, issues, legal and security aspects in M-Commerce	K3
CLO4	Analyze the infrastructure, fraud prevention and payment methodologies and examine the legal and ethical issues in mobile commerce	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	M	S	S	S	L
CLO2	S	S	M	S	M	L
CLO3	S	S	S	S	M	L
CLO4	S	S	S	M	S	L

S- Strong; M-Medium; L-Low.

M-COMMERCE (CS22A02) – [58 Hrs]

UNIT – I **(12 Hrs)**

Introduction to E- commerce: Introduction - E-commerce - E-business - Categories of E-commerce applications - Traditional and Electronic commerce - Advantages and disadvantages of E-commerce. Business Models of E-commerce: Introduction - Business models of E-commerce- Business to Consumer (B2C) - Business to Business (B2B) - Difference between B2C and B2B - C2C: Definition - Characteristics and Applications of C2C EC.

UNIT – II **(11 Hrs)**

Mobile commerce and WAP: Introduction to Mobile commerce - Application - Advantages of M-commerce - Wireless Application Protocol - WAP Browser - Features of WAP 2.0 - Technologies of M-commerce .

UNIT – III **(12 Hrs)**

Mobile commerce Risk, Security and Payment Methods: Introduction - Security and Payment Methods - Mobile Commerce Security - Security Mechanism - Mobile Security - Network Infrastructure and Security- WLAN and Security - WAP and Security - Mobile commerce payment methods - Mobile payment operations .

UNIT – IV **(12 Hrs)**

Mobile Money Infrastructure and Fraud Prevention for M- Payment: Introduction - Requirement for authentication infrastructure for M-commerce - Trust relationship - Requirement for Mobile commerce - Password based authentication for mobile users with support for public key technology - M - payment value chain - Life cycle - Operational Issues in M-Commerce payment - Mobile payment systems - General analysis of the payment solutions.

UNIT – V **(11 Hrs)**

Legal and Ethical Issues : Introduction - Issues related to E- commerce - Legal issues - Taxation and E-commerce - Cyber Laws : Introduction - Cyber laws in India - Salient Provisions of Cyber Law - Contracting and contract Enforcement - IT act 2000.

TEXT BOOK

1. Dr. U.S.Pandey and Er. Saurabh Shukla, E- Commerce and Mobile Commerce Technologies, S.Chand & Company Pvt. Ltd 2nd Revised Edition, 2nd Revised Edition, 2014

REFERENCE BOOKS

1. Karabi Bandyopadhya, Mobile Commerce, Prentice Hall India Learning Private Limited, 2013
2. Paul May, Mobile Commerce: Opportunities, Applications and Technologies of Wirele Business, Cambridge University Press; 1st Edition, 1st Edition, 2001
3. Norman Sadeh, M-Commerce: Technologie Services, and Business Mo, John Wiley & Sons, 2003

PEDAGOGY

Lectures, Group discussions, Demonstrations, Case studies

COURSE DESIGNER

Ms. P. Parvathi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP22A03	DIGITAL ELECTRONICS AND MICROPROCESSOR	III	58	2	-	3

PREAMBLE

To provide knowledge about the principles and practices of digital electronics and computer system, programming aspects of microprocessor covering both hardware and software based on the 8085-microprocessor family.

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Acquire the basic knowledge of digital logic circuits, microprocessor and its application to understand about its processes.	K1
CLO2	Understand the working mechanism of various combinational, sequential circuits and their role in the digital system design.	K2
CLO3	Comprehensive understanding of memory and its applications	K2
CLO4	Demonstrate how circuits are works through graphical representation.	K3

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	L
CLO2	M	M	S	M	S	L
CLO3	M	S	S	S	S	L
CLO4	S	S	S	M	S	L

S- Strong; M-Medium; L-Low

DIGITAL ELECTRONICS AND MICROPROCESSOR (AP22A03) – [58 Hrs]

UNIT I **(12 Hrs)**

Number System and Codes: Binary Number System -Binary to decimal Conversion-Decimal-to binary Conversion-ASCII Code-**Error Detection and Correction**. Arithmetic Circuits: Binary Addition- Binary Subtraction-Unsigned Binary Numbers-2's Complement Representation-2's ComplementArithmetic-The Adder-subtracter-**Arithmetic Logic unit- Binary Multiplication and Division.**

UNIT II **(12 Hrs)**

Digital Logic Units: The Basic Gates-NOT-OR-AND-Universal Logic Gates-NOR, NAND-AND-OR- **Inverter Gates**. Combinational Logic Circuits: Boolean Laws and Theorems-Sum of Products Method- Truth Table to Karnaugh Map- Don't care Conditions-**Product of sums Method**. Data Processing circuits: Multiplexers-Demultiplexers-BCD-to-decimal Decoders-**Encoders.**

UNIT III **(11 Hrs)**

Flip-Flops: RS FLIP FLOPS, Gated FLIP FLOPs -FLIP FLOP Timing-JK Master-slave FLIP FLOPS- **Analysis of Sequential Circuits**-Conversion of FLIP FLOP. Registers: Types of Registers-Serial In- serial Out - Serial In-parallel Out - Parallel In-serial Out-**Parallel In-parallel Out - Universal Shift Register.**

UNIT IV: **(11Hrs.)**

Architecture and Organization of Microprocessor 8085: Introduction- Evolution of Microprocessor- Microcomputer System- Microprocessor Operations- Functional Description of 8085- **System Bus of 8085- Pin Description of 8085.**

UNIT V: **(12Hrs.)**

Instruction Set of 8085 Microprocessor: Introduction- Instruction Format- Addressing Modes of MP 8085- **Timing Effects of Addressing Modes- Instruction Set Classification**. Interrupts of 8085:Introduction- Interrupt Systems- Types of Interrupts in 8085- Hardware Interrupts of 8085- Software Interrupts of 8085- **Interrupt Related Instructions.**

TEXT BOOKS

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, Digital Principles and Applications, (UNITI,II &III), McGraw Hill Education (India) Private Limited. 8th Edition,2019

2. Sunil Mathur &Jeebananda Panda, "Microprocessor and Microcontrollers", (UNIT IV,V),PHILearning Pvt. Ltd, 2016

REFERENCE BOOKS

1. S.Salivahanan, S.Arivazhagan, Digital Circuits and Design, Vikas Publishing house Pvt Ltd., 3rdEdition, 2009.
2. Debasis Das, Ujjwal Lanjewar, Fundamentals of Digital Electronics & 8086 Microprocessor,UBS Publishers distributors Pvt. Ltd, 1st Edition2020

PEDAGOGY

Chalk and Talk PPT, Demo, Discussion, Quiz, and Assignment, Seminar.

COURSE DESIGNERS

Mrs. S. Mohana Priya

SEMESTER – V

Course Number	Course Name	Category	L	T	P	Credit
AI22C08	**SOFTWARE ENGINEERING**	**Theory**	**58**	**2**	**-**	**3**

Preamble

This course includes the basic concepts of software engineering to design a high-quality new software project. This course also covers the fundamental techniques of software requirements, analysis and design.

Prerequisite

Database

Course Learning Outcomes

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

CLO NO	CLO Statement	Knowledge Level
CLO 1	Remember the principles, models and various phases of software engineering	K1
CLO 2	Understand the appropriate software architectures and patterns to carry out high-level design of a system and be able to critically compare alternative choices.	K2
CLO 3	Apply the design and testing principles to software project development.	K3
CLO 4	Analyze the principles to software project development and various processes used in all the phases of the software products	K4

Mapping with Programming Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I **(12 Hrs)**

Software and Software Engineering: The Nature of Software –The Software Process-**Software Engineering Practice-** Process Models: Prescriptive Process Models-**Product and Process**. Agility and Process – What is an Agile Process? – Scrum – Other Agile Frameworks

UNIT II **(12 Hrs)**

Understanding Requirements: Requirements Engineering-Establishing the Groundwork- Requirements Gathering - **Developing Use Cases-Building the Analysis Model**-Negotiating Requirements-Validating Requirements. Requirements Modeling: **Requirement Analysis-Scenario-Based Modeling.**

UNIT III **(12 Hrs)**

Design Concepts: The Design Process –Design Concepts -The Design Model. Architectural Design: Software Architecture **Quality Concepts: What is Quality? -Achieving Software Quality.** Software Quality Assurance: Elements of Software Quality Assurance.

UNIT IV **(11 Hrs)**

Software Testing – Component Level: A Strategic Approach to Software Testing- White-Box Testing – Black –Box Testing- Integration Testing- Validation Testing. **Product Metrics: Metrics for the Requirements Model-Metrics for Design model – Design metrics for conventional software & object-oriented software.**

UNIT V **(11 Hrs)**

Risk Management: Software Risks-Risk Identification- Risk Projection - Risk Refinement. Software Maintenance– Maintenance Types- Maintenance Tasks - **Reverse Engineering- Software Process Improvement: What is SPI? -The SPI Process -SPI Trends.**

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Roger Pressman and Bruce Maxim	SoftwareEngineering – A Practitioner's Approach	2020	MC-GrawHill Publication, 9th Edition

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Ian Somerville	Software Engineering	2017	Pearson Education,10th Edition
2.	Richard Fairley	Software Engineering concepts	2017	MC –Graw Hill, 3rd Edition

Web Resource :

1. https://link.springer.com/book/10.1007/978-3-030-89247-0,Fundamentals of Software Engineering,9th International Conference, FSEN 2021,Virtual Event, May 19–21, 2021, Revised Selected Papers

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS

1. Dr. R. Suriyagrace
2. Mrs. S. Shanthi

Course Number	Course Name	Category	L	T	P	Credit
AI22C09	MODERN ARTIFICIAL INTELLIGENCE	Theory	58	2	-	3

PREAMBLE

This course introduces the concepts of Artificial Intelligence and the various methods of solving problems using Artificial Intelligence. It also provides insights on AI techniques and its applications.

PREREQUISITE

AI concepts

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the principles of Artificial Intelligence	K1
CLO2	Understand problem solving techniques for complex problems	K2
CLO3	Apply decision making, machine learning, NLP and computer vision techniques in real time applications	K3
CLO4	Analyze various real-world problems to find suitable AI solutions	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	L	L	M
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	S	M	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I **(12 hrs)**

Artificial Intelligence: Introduction- What is AI – Foundations of AI - Problem-solving: Solving problems by searching : Problem-solving agents – Uninformed Search Strategies – Informed Search Strategies- Beyond classical Search: Local Search Algorithms and Optimization Problems. Knowledge Reasoning and Planning : Logical Agents - **Knowledge Based Agents - Logic-Propositional Logic-Knowledge Representation : Categories & Objects.**

UNIT II **(12 hrs)**

Uncertain Knowledge and reasoning: Acting under uncertainty – Basic Probability Notation –Bayes Rule and its use – Probabilistic Reasoning: Representing knowledge in the uncertain domain –the semantics of Bayesian Networks – **Probabilistic Reasoning over time: Time and uncertainty – Inference in temporal models** – Hidden Markov models – **Kalman filters**.

UNIT III **(12 hrs)**

Learning from Examples : Forms of Learning - Supervised Learning - Decision Trees - Regression and Classification - ANN - **Non Parametric Models** - Learning Probabilistic Models : Statistical Learning - Reinforcement Learning : Passive and Active Reinforcement Learning - **Applications of Reinforcement Learning.**

UNIT IV **(11 hrs)**

Natural Language Processing : Language Models - Text Classification - Augmented Grammars and Semantic Analysis– Speech Recognition - **Perception : Image Formation** - Early Image Processing Operations - Object Recognition by Appearance - **Object Recognition from Structural Information.**

UNIT V **(11 hrs)**

Robotics: Robotic perception – Planning to Move - Planning uncertain movements – Moving - Reinforcement learning in robotics - The Present and Future AI - Case Studies: **AI in Retail (Alibaba, Walmart) - AI in Social Media Services (Facebook). Home and workplace Automation with AI (Samsung)**.

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Stuart J. Russell, Peter Norvig	Artificial Intelligence: A Modern Approach	2020	Pearson Publishing, Third edition

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Ian Good fellow, Yoshua Bengio, Aaron Courville	Deep Learning	2016	MIT Press, 1st Edition
2.	Tom M. Mitchell	Machine Learning	1997	Tata McGraw-Hill,New Delhi, 1st Edition
3.	SureshSamudrala	Demystifying Machine Learning, Neural Networks and deep learning	2019	Notion Press, 1st Edition
4.	Bernard Marr	Artificial Intelligence in Practice	2019	Wiley Publications, 1st Edition

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS

1. Mrs. S. Shanthi
2. Mrs. T.PrabaKumari

Course Number	Course Name	Category	L	T	P	Credit
AI22C10	MACHINE LEARNING	Theory	73	2	-	4

Preamble

This course introduces the fundamentals of Machine Learning and its algorithms. It also covers various supervised and unsupervised learning algorithms used for classification, prediction and clustering.

Pre-requisite

- Linear Algebra
- Data Mining

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basics of machine learning techniques	K1
CLO2	Understand the techniques of machine learning.	K2
CLO3	Apply supervised and unsupervised learning algorithms for classification, prediction and clustering	K3
CLO4	Analyze the efficiency of machine learning algorithms suitable for applications.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

SYLLABUS

UNIT I (14 Hrs.)

The Machine Learning Landscape: Introduction to Machine Learning - Why Use Machine Learning? - Examples of Applications - Types of Machine Learning systems – Main Challenges of Machine Learning – Testing and Validating - Classification and Prediction - **The Role of Python in Machine Learning - Anaconda in Python - Python Libraries.**

UNIT II **(15 Hrs.)**

Classification: MNIST - Training a Binary Classifier - Performance Measures: Measuring Accuracy Using Cross-Validation - Confusion Matrix - Precision and Recall - Precision/Recall Trade-off - The ROC Curve. Multiclass Classification - Multilabel Classification - Multi Output Classification – Classification Tree. **Advanced Machine Learning: Scikit-Learn Library for Machine Learning** - Cross-Validation. **Support Vector Machine: Linear SVM Classification – Nonlinear SVM Classification.**

UNIT III **(15 Hrs)**

Linear Regression: Simple Linear Regression – Steps in Building a Regression Model – Building Simple Linear Regression Model – Multiple Linear Regression: Developing Multiple Linear Regression Model Using Python – **Categorical Encoding Features - Splitting the Dataset into Train and Validation Sets - Building the Model on a Training Dataset** – Logistic Regression.

UNIT IV **(14 Hrs)**

Unsupervised Learning Techniques: Clustering – K-Means Clustering – Limits of K-Means – Clustering for Image Segmentation - Clustering for Preprocessing - Clustering for Semi-Supervised Learning – DBSCAN – **Other Clustering Algorithm**. **Creating Product Segments Using Clustering - Hierarchical Clustering.**

UNIT V **(15 Hrs)**

Forecasting: Forecasting Overview - Components of Time-Series Data. Recommender Systems: Overview – Association Rules – Applying Association Rules. Text Analytics: Overview – Sentiment Classification - **Naïve-Bayes Model for Sentiment Classification**. **Introduction to Artificial Neural Networks with Keras: From Biological to Artificial Neurons**. Deep Computer Vision Using Convolutional Neural Networks: Convolutional Layers.

TEXT BOOK

S.No.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\EDITION
1.	Manaranjan Pradhan, U Dinesh Kumar	Machine Learning Using Python	2019	Wiley India, First Edition
2.	Aurelien Geron	Hands-On-Machine Learning with Scikit Learn, Keras and Tensorflow Concepts Tools and Techniques to Build Intelligent Systems	2019	O'Reilly Media, Second Edition

REFERENCE BOOK

S.No.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\EDITION
1.	Tom M Mitchell	Machine Learning	2017	Tata Mc-Graw Hill, 1st Edition
2.	Anuradha SrinivasaRaghavan, Vincy, Joseph	Machine Learning	2019	Wiley India, First Edition
3.	Zsolt Nagy	Artificial Intelligence and Machine Learning	2018	Packt Publisher, 1st Edition
4.	Dr. S. Sridhar, Dr. M. Vijayalakshmi	Machine Learning	2021	Oxford University Press, 1st Edition

PEDAGOGY:

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS:

1. Ms.S.Shanthi
2. Dr. R.Suriyagrace

Course Number	Course Name	Category	L	T	P	Credit
AI21E01	ELECTIVE PAPER 1: INTERNET OF THINGS	Theory	73	2	-	4

Preamble

This course introduces the fundamentals of IoT, gives insight into the application areas of IoT and deals with the IoT protocols. It includes the IoT strategy and protocol. This Course also covers Web of Things and Cloud of Things.

Prerequisites

- Computer Networks
- Computer Hardware

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify building blocks of Internet of Things and its characteristics	K1
CLO2	Understand the Smart Objects and IoT Architectures	K2
CLO3	Apply the Concept of Internet of Things in the real-world scenario	K3
CLO4	Analyze the benefits IoT based systems	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I **(15 Hrs.)**

Introduction to IoT: Defining Internet of Things (IoT), Pillars of IoT: M2M, RFID, WSN and SCADA. IoT Strategy: Device, Connect and Manage (DCM) Strategy, **Communication Middleware's for IoT.**

UNIT II **(15 Hrs.)**

Protocol Standardization: IoT Protocol Standardization, Unified Data Standards. **IoT Levels & Deployment Templates.** Prototyping Embedded Design: Arduino, RaspberryPi.

UNIT III **(14 Hrs.)**

Web of Things (WoT): Introducing Web of Things (WoT), Platform Middlewares, Unified Multitier WoT Architecture, **WoT Portals and Business Intelligence.**

UNIT IV **(14 Hrs.)**

Cloud of Things (CoT): Cloud Computing Basic, IoT and Cloud Computing, Mobile Cloud Computing, **Cloud of Things Architecture**

UNIT V **(15 Hrs.)**

Case Study and Real World IoT Applications: Home Automation, Cities, Environment, Energy, Retail, **Logistics, Agriculture,** Industry, Health and Life Style, Intelligent Transport Systems, **Smart Grid, Smart Buildings**

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Honbo Zhou	The Internet of Things in the Cloud: A Middleware Perspective	2012	CRC Press, First Edition.
2.	Arshdeep Bahga, Vijay Madisetti	Internet of Things: A Hands-on Approach	2015	Universities Press, First Edition.

REFERENCE BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Adrian McEwen, Hakim Cassimally	Designing the Internet of Things	2014	Wiley Publications, First Edition.

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS

1. Ms. M.Loganayaki
2. Dr. R.Suriyagrace

Course Number	Course Name	Category	L	T	P	Credit
AI22E02	ELECTIVE PAPER 2: NATURAL LANGUAGE PROCESSING	Theory	73	2	-	4

Preamble

This course introduces the methods in Natural Language Processing (NLP). This course includes the various algorithms used in NLP. This course also covers various NLP tools and techniques

Prerequisite

1. Data mining
2. Machine Learning

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the principles and concepts of Natural Language Processing	K1
CLO2	Understand the techniques of text processing	K2
CLO3	Apply NLP methods and tools for real time applications	K3
CLO4	Analyze the issues in text data processing and identifying suitable methods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I **(15 Hrs.)**

Introduction : Brief History of NLP - Significance of NLP – Early NLP Systems – Role of Knowledge in NLP – Phases of NLP – Evaluation of NLP Processing Systems. Speech Processing – Programming Languages used for NLP. **Basic English Concepts : Fundamental Terminologies of English Grammar. Advanced Grammars : Feature Grammars.**

UNIT II **(15 Hrs.)**

Classical Approaches to NLP : Context – Classical Tool Kit – Text Processing : Introduction – Challenges of Text Processing – Language Dependence – Tokenization – Sentence Segmentation. Lexical Analysis : Introduction – Finite State Morphology – **Isomorphism Problems – Contiguity Problems – Paradigm Based Lexical Analysis.**

UNIT III **(15 Hrs.)**

Syntactic Parsing : Introduction – Context-Free Grammars – Syntax Trees – **Other Grammar Formalisms – Basic Concepts in Parsing** – The Cocke-Kasami-Younger Algorithm – Handling Unary Rules – Parsing as Deduction - Bottom-Up - Left Corner Parsing – Top-Down Earley Style Parsing – LR Parsing – **Constraint Based Grammars - Issues in Parsing.**

UNIT IV **(14 Hrs.)**

Semantic Analysis : Basic Concepts and Issues in Natural Language Semantics – Theories and Approaches to Semantic Representation – Relational Issues in Lexical Semantics. Fine-Grained Lexical Semantic Analysis – Three Case Studies. Natural Language Generation : Generation Compared to Comprehension – **Examples of Generated Texts from Complex to Simple and Back Again – The Linguistic Component – The Cutting Edge.**

UNIT V **(14 Hrs.)**

Corpus Creation : Corpus Size – Balance, Representativeness and Sampling – Data Capture and Copyright – Corpus Markups and Annotations – Multilingual Corpora – Multimodal Corpora – **BioNLP : Basic Domains – Biomedical Text Mining – Case Studies – Tools.**

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Ela Kumar	Natural Language Processing	2011	IK International Publishing House Pvt. Ltd, 1st Edition
2.	Nitin Indurkhya, Fred J.Damerau	Handbook of Natural Language Processing	2010	Chapman & Hall,CRC Press 3rd Edition

REFERENEC BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Lan H Written and Elbef,MarkA.Hall,	Data mining: practical machine learning tools and techniques	2013	MorganKaufman, 2nd Edition
2.	Steven Bird, Ewan Klein, and Edward Loper	Natural Language Processing with Python	2009	O'Reilly, First Edition
3.	NitinIndurkhya, Fred J. Damerau	Handbook of Natural Language Processing	2010	CRC Press, 2nd Edition

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS

1. Dr. R. Suriyagrace
2. Ms.T.Prabakumari

Course Number	Course Name	Category	L	T	P	Credit
AI22E03	Elective Paper 3: INFORMATION RETRIEVAL	Theory	73	2	-	4

Preamble

This course presents the concepts of document representation, document indexing, digital information storage, retrieval and distribution. It also introduces effective search strategies for IR systems, vector space model, text classification and evaluation methods of IR systems.

Prerequisite

- Database Management systems
- Data mining

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of information representation and retrieval	K1
CLO2	Understand the techniques and algorithms of information retrieval	K2
CLO3	Apply the concepts of information retrieval for simple tasks	K3
CLO4	Analyze the techniques appropriate for suitable IR applications.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I **(14 Hrs.)**

Boolean retrieval: Information retrieval problem - Processing Boolean queries - Boolean model versus ranked retrieval. The term vocabulary and postings list: Determining the vocabulary of terms - **Faster postings list intersection via skip pointers - Positional postings and phrase queries.**

UNIT II **(15 Hrs.)**

Dictionaries and tolerant retrieval: Search structures for dictionaries - **Wildcard queries - Spelling correction.** Index construction: **Hardware basics** - Blocked sort-based indexing - Single-pass in-memory indexing - Distributed indexing - Dynamic indexing.

UNIT III **(15 Hrs.)**

Scoring, term weighting, and the vector space model: Parametric and zone indexes - Term frequency

and weighting - The vector space model for scoring. Evaluation in information retrieval: Information retrieval system evaluation- Standard test collections -**Evaluation of unranked retrieval sets - Evaluation of ranked retrieval results – Assessing relevance.**

UNIT IV (15 Hrs.)

XML retrieval: Basic XML concepts -A vector space model for XML retrieval-Evaluation of XML retrieval - **Text-centric vs. data-centric XML retrieval.** Text classification and Naive Bayes: The text classification problem - Naive Bayes text classification - **Properties of Naive Bayes - Feature selection** - Evaluation of text classification.

UNIT V (14 Hrs.)

Vector space classification: Document representations and measures of relatedness in vector spaces – K nearest neighbor – Flat clustering: Clustering in information retrieval - Evaluation of clustering - K-means – Web search basics - Web characteristics - **Advertising as the economic model – Search user experience – Basic Page Rank.**

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Christopher D. Manning, Prabhakar Raghavan, Henrich Schutze	Introduction to Information Retrieval	2017	New York: Cambridge University Press, 3rd Edition

REFERENCE BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Stefan Buttcheret.al	Information Retrieval - Implementing and Evaluating	2012	MIT Press, First Edition.
2.	Dr Ricardo Baeza-Yates et.al	Modern Information Retrieval: The Concepts and Technology	2011	Addison Wesley, 2nd Edition.
3.	David A. Grossman and OphirFrieder	Information Retrieval	2010	UniversitiesPress, 1st Edition.

PEDAGOGY

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar

COURSE DESIGNERS

1. Ms. S.Shanthi
2. Dr. R.Suriyagrace

Course Number	Course Name	Category	L	T	P	Credit
AI22CP7	ARTIFICIAL INTELLIGENCE LAB - I	Practical	-	-	60	3

PREAMBLE

This course provides exercises to implement artificial intelligence techniques using Python. The lab covers the following exercises.

PREREQUISITE

- AI Concept
- Neural Network Techniques

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the programming concepts of AI	K1
CLO2	Understand logical concepts of AI to solve puzzles and searching problems	K2
CLO3	Apply AI mechanism to create various gaming applications, Chatbots and Recommender System applications	K3
CLO4	Analyze real-time problems and identify suitable AI solution	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	L	M
CLO2	S	S	M	S	M	L
CLO3	S	S	M	M	L	L
CLO4	S	S	M	S	L	L

S- Strong; M-Medium; L-Low

ARTIFICIAL INTELLIGENCE LAB – I (AI22CP7)

LIST OF EXERCISES

- Creation of AI-powered Chatbots application
- Construction of AI Recommender System using Python
- Exercise on Spam Identification using AI
- Creation of Handwriting Recognizer using Computer Vision in AI
- Implementation of Image Recognition System using CNN
- Exercises to implement Speech Emotion Recognition system using AI
- Exercises to build genetic models using bioinformatics data
- Exercises to implement sentimental analysis on text data

PEDAGOGY

Demonstration, Lecture, Group Discussion

COURSE DESIGNERS

1. Ms. S.Shanthi
2. Dr. R.Suriyagrace

Course Number	Course Name	Category	L	T	P	Credits
AI22CP8	**MACHINE LEARNING LAB**	**Practical**	**-**	**-**	**45**	**3**

Preamble

This course introduces sci-kit learn, the machine learning library in Python. It also provides exercises to implement machine learning and deep learning algorithms using Keras and Tensorflow

Prerequisites

- Python Programming
- ML Techniques

Course Learning Outcomes

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

CO Number	CO Statement	Knowledge level
CLO1	Remember in-built libraries and packages in python, basic concepts and techniques of machine Learning and deep learning algorithms	K1
CLO2	Understand the process of Machine Learning and deep learning algorithms	K2
CLO3	Implement machine learning and deep learning algorithms for Artificial Intelligence problems	K3
CLO4	Analyze the suitable machine learning algorithms for different applications.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	L	M
CLO2	S	S	M	S	M	L
CLO3	S	S	M	M	L	L
CLO4	S	S	M	S	L	L

S- Strong; M-Medium; L-Low

LIST OF EXERCISES:

1. Exercises to extract features from datasets using Sci-kit
2. Exercises to implement feature selection methods using Sci-kit
3. Exercises to implement various Regression Techniques using Sci-kit
4. Exercises to implement Classification Techniques using Sci-kit
5. Exercises to implement Clustering Algorithms using Sci-kit
6. Exercises to implement multilayer Perceptrons and Artificial Neural Networks using Keras and Tensor flow
7. Exercises to implement ANN Algorithms using Keras and Tensor flow

PEDAGOGY

Demonstrations

COURSE DESIGNERS

1. Ms.S.Shanthi
2. Ms.T.Prabakumari

Course Number	Course Name	Category	L	T	P	Credits
AI21SBCE	**COURSERA: IBM APPLIED AI**	**III**	**45**	**-**	**-**	**3**

AI Application Development (IBM Applied AI)

S. NO.	COURSE NAME	COURSE LINK	HOURS
1	Introduction to Artificial Intelligence	https://www.coursera.org/learn/introduction-to-ai?specialization=applied-artifical-intelligence-ibm-watson-ai	8
2	Introduction to HTML, CSS, & JavaScript	https://www.coursera.org/learn/introduction-html-css-javascript?specialization=applied-artifical-intelligence-ibm-watson-ai	10
3	Building AI powered Chatbots without Programming	https://www.coursera.org/learn/building-ai-powered-chatbots?specialization=applied-artifical-intelligence-ibm-watson-ai	12
4	Building Generative AI-Powered Applications with Python	https://www.coursera.org/learn/building-gen-ai-powered-applications?specialization=applied-artifical-intelligence-ibm-watson-ai	14
	TOTAL HOURS		**44**

Course Number	Course Name	Caregory	L	T	P	Credits
AI21SBP4	SKILL BASED SUBJECT : DATA ANALYTICS TOOLS	III	-	-	45	3

PREAMBLE

This course introduces the methods for data preparation and data understanding. It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.

PREREQUISITE

- Statistics
- Data Mining

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	KnowledgeLevel
CLO1	Recall the basic concepts in python with EDA and Google analytics	K1
CLO2	Understand the fundamentals of Google analytics event tracking and methods of data preprocessing	K2
CLO3	Apply basic statistics in the dataset and visualize the data using basic graphs and plots	K3
CLO4	Analyze the techniques of data exploration for sample data sets by choosing appropriate methods	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SKILL BASED SUBJECT: DATA ANALYTICS TOOLS (AI21SBP4)

LIST OF EXERCISES

Google Analytics

- Exercises to find total number of users, new users, page views, pages per session, average session duration, bounce rate for the given website
- Exercises to find the percent of users that are new visitors versus returning visitors, the number of users and their percentages for the top 3 languages in the specific website
- Generation of data acquisition report for the different channels of the website
- Exercises to analyze the sources / mediums of producing the lowest bounce rate for the website.
- Exercises to find the highest page views in the website.
- Exercises to find the traffic percentage of search items in the website.

Text Analytics using KNIME

- Exercises to implement pre-processing of text data
- Exercises to implement transformation of text data
- Exercises to implement classification of text data
- Exercise s to implement visualization of text data
- Exercises to implement clustering of text data

PEDAGOGY

Demonstration

COURSE DESIGNERS

1. Dr.R.Suriyagrace
2. Mrs.S.Shanthi

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
NM21CS1	CYBER SECURITY 1	THEORY	30	-	-	Grade

Preamble

This course introduces fundamental concepts of Cyber Security in the digital era. It providesknowledge of cybercrimes, cyber laws and also the security of digital devices. It helps to do secure digital transactions and safe usage of social media.

SYLLABUS

UNIT I **(6 Hrs)**

Principles of Cyber security: Introduction to Cyber security - Defining cyberspace - Architecture of cyberspace - Communication and web technology - Internet infrastructure for data transfer and governance - Regulation of cyberspace - Concept of Cyber security - Issue and challenges of cyber security.

UNIT II **(6 Hrs)**

Cyber Crime: Introduction to Cybercrime - Classification of Cyber-crimes – Cyber-crime against women and children – Financial frauds - Social engineering attacks – Malware - Zero day and zero click attacks.

UNIT III **(6 Hrs)**

Cyber Law: Cyber Criminals modus-operandi – Reporting of cybercrimes – remedial and mitigation measures – Legal perspective of cybercrime– IT Act 2000 and its amendments – Organization dealingwith cybercrimes and cyber security in India.

UNIT IV **(6 Hrs)**

Social Media Security: Introduction to social network – Types of social media – Social media platform – Hashtag – Viral content – Security issues related to social media. – **Cyber Security tools:** N map – Introduction to Nmap – Nmap scan types- Nmap command list. **DigitalTransaction:** Introduction to digital payments – Components of digital payments – Modes ofdigital payments – Banking cards – UPI (Unified Payment Interface) – e-Wallets.

UNIT V **(6 Hrs)**

Digital Devices Security: End point device and Mobile phone security – Password policy – Security patch management – Data backup – Device security policy – Cyber security best practices. Installation and configuration of Computer Anti-Virus. **Case studies:** Illustrations of Financial frauds – Digital Signature. Prepare a checklist for secure net banking.

*e-Content will be provided.
*This course is for all final year students of all streams from 2023-24 onwards.

REFERENCE BOOKS

1. Raef Meeuwisse, Cybersecurity for Beginners, Lulu Publishing Services,2nd Edition,2017
2. Scott Augenbaum, The Secret to Cybersecurity-A Simple Plan to Protect Your Family and Business from Cybercrime , Forefront Books Publisher,2019
3. Sunit Belapure and Nina GodBole, Cyber security understanding cybercrimes computer forensics and Legal perspectives, Wiley India Pvt Ltd, 2011
4. Christopher Hadnagy, Social Engineering: The Science of Human Hacking, Wiley Publisher, 2nd Edition,2018
5. Pavan Duggal, Artificial Intelligence, Cybercrimes & Cyberlaw,2018
6. Joe Gray, Practical Social Engineering: A Primer for the Ethical Hacker, 2022
7. Security in the digital age: social media security threats and vulnerabilities by Henry A. Oliver, Create Space Independent publishing platform.

EVALUATION PATTERN

QUIZ	60 MARKS
CASE STUDY	20 MARKS
POSTER	20 MARKS

Course Number	Course Name	Category	L	T	P	Credit
AI21AC1	ADVANCED LEARNERS COURSE 1: PAPER 1: BUSINESS DOMAINS FOR ARTIFICIAL INTELLIGENCE	Theory	-	-	-	5**

Preamble:

This course provides basic domain knowledge in the functional areas of Data Analytics and Artificial Intelligence. Various important functional areas such as Health care analytics, Banking and Finance, Telecommunication, and Retail Analytics are elaborated in this course.

Prerequisite

- Foundations of Data Science

Course Learning Outcomes

On successful completion of this course, students should be able to:

CLO Number	CO Statement	Knowledge Level
CLO1	Remember various domain areas and their issues	K1
CLO2	Understand the concepts of analytics to make better decisions	K2
CLO3	Apply the use cases for different business domains	K3
CLO4	Analyze the issues in various domains and choose appropriate analytics solutions	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SYLLABUS

UNIT I

Retail analytics: Understanding the new consumer – Marketing in a consumer-driven era - Managing the brand to drive loyalty

UNIT II

Healthcare analytics: Introduction - Potential contributions - Challenges of healthcare industry - current

and future state of healthcare analytics – top healthcare analytics adaptations

UNIT III

Banking and Finance: Systems of Banking – Commercial Banking – New Financial Services: Insurance Services – Types of Insurance – Housing Finance.

UNIT IV

Telecommunication: Introduction - End-User Needs and Demands- Telecom Business

UNIT V

Supply Chain Management: Definition of Supply Chain - Historical Perspective - objectives and importance - Decision phases and process views of a supply chain (SC) - Examples of supply chain - Financial measures and drivers of SC performance – Framework for Structuring Drivers – Facilities – Inventory – Transportation – Information – Sourcing – Pricing.

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS \ EDITION	YEAR OF PUBLICATION
1.	Jennifer Leclaire, Danielle Dahlstrom, Vivian Braun	Business analytics in Retail for dummies	2nd IBM Limited edition	2014
2.	Dwight McNeill	A Framework for Applying Analytics in Healthcare: What can be Learned from Best Practices in Banking, Retail, Politics and Sports	Pearson Education	2013
3.	Gomez Clifford	Banking and Finance Theory Law and practice	PHI Learning	2011
4.	Anders Olsson	Understanding Changing Telecommunications	Wiley Publications	2004
5.	Sunil Chopra, Peter Meindl and DV Karla	Supply Chain Management: Strategy, planning and operation	5th Edition, Pearson Education	2013

Course Designers:

1. Ms.M.Loganayaki
2. Ms.T.Prabahkumari

Course Number	Course Name	Category	L	T	P	Credit
AI21AC2	ADVANCED LEARNERS COURSE 1: PAPER 2: BUSINESS INTELLIGENCE	Theory	-	-	-	5**

Preamble

This course introduces the technical components in Business Intelligence. It also includes web analytic business concepts, data warehouses, operational business intelligence, and applications of data mining in business.

Pre-requisite

- Database Management Systems
- Data Mining

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the function, process, services and tools of BI	K1
CLO2	Understand the knowledge management principles and its architecture, approaches, tools and models	K2
CLO3	Apply business intelligence knowledge to manage BI projects in different domains	K3
CLO4	Analyze the marketing activities with marketing concepts and explore the Knowledge in business intelligence	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low.

SYLLABUS

UNIT I

Components of the decision-making process: Business intelligence - Effective and timely decisions, Data, information and knowledge, Role of mathematical models, Business intelligence architectures, Ethics and business intelligence. Decision support systems - Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.

UNIT II

Business Intelligence and Information Exploitation – Need for Business Intelligence, Information Asset, Exploiting Information, Business Intelligence and Program Success, Actionable Knowledge. Value of Business Intelligence - Information Asset and Data Valuation, Actionable Knowledge-Return on Investment, Business Intelligence Applications, Intelligence Dashboard, business Intelligence adds Value. Planning for Success - Initiating a Program, Business/Information Technology Partnership, Business Intelligence Success Factors, Team Building, Strategic versus Tactical Planning.

UNIT III

Business Intelligence Environment - Business Case, Business Intelligence Process, System Infrastructure, Information Access, Delivery, and Analysis, Services, Management Issues. Business Models and Information Flow - Business Case, Information Processing and Information Flow, Information Flow Model, Usage in Practice, Modeling Frameworks, Management Issues.

UNIT IV

Data Warehouses, Online Analytical Processing, and Metadata - Business Case, Data Models, Data Warehouse, Data Mart, Online Analytical Processing, Metadata, Management Issues. Business Rules - Business Case, Business Rules Approach, Business Rule, Business Rule System, Sources of Business Rules, Management Issues.

UNIT V

Business intelligence applications: Marketing models - Relational marketing, Salesforce management, Business case studies. Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems, Business case studies.

TEXTBOOKS

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\EDITION	YEAR OF PUBLICATION
1	Carlo Vercellis	Business Intelligence : Data Mining and Optimization for Decision Making	Wiley Publications	2009
2	David Loshin Morgan, Kaufman	Business Intelligence : The Savvy Manager's Guide	Second Edition	2012

TEXTBOOKS

S.No	AUTHOR	TITLE OF THE BOOK	PUBLISHERS\EDITION	YEAR OF PUBLICATION
1	Efraim Turban, Ramesh Sharda, Dursun Delen	Decision Support and Business Intelligence Systems	9th Edition, Pearson	2013
2	M.Raisinghani	Business Intelligence : in the Digital Economy-Opportunities, Limitations and Risks	Idea Group Publications	2004

COURSE DESIGNERS

1. Dr.R.Suriyagrace
2. Ms.S.Shanthi

SEMESTER VI

Course Code	Course Name	Course Type	L	T	P	Credits
AI22C11	COMPUTER NETWORKS	Theory	73	2	-	3

PREAMBLE

This course provides basic concepts of computer networks and its applications. This course provides an understanding of different components of computer networks, layers, various protocols and their applications.

PREREQUISITES

Computer Hardware

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the different building blocks of computer networks and its architecture	K1
CLO2	Understand the fundamental concepts of computer networking, Protocols, architectures and applications.	K2
CLO3	Apply the principles of network architecture in data communication	K3
CLO4	Analyze the protocols available in different layers of computer network architecture	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1.	S	S	S	M	L	L
CLO2.	S	S	S	M	L	L
CLO3.	S	S	S	M	L	L
CLO4.	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

COMPUTER NETWORKS (AI21C11) – [73 Hrs]

UNIT I (15 Hrs)

Introduction: Uses of Computer networks: Business Applications, Home Applications, Mobile Users- **Network Hardware: PAN, LAN, MAN, WAN, Internetworks.** Network Software: Protocol Hierarchies, Design Issues for the layers, **Connection – oriented Vs. Connectionless services**. Service Primitives. OSI reference model, TCP/IP reference model.

UNIT II (15 Hrs)

Physical Layer: Guided Transmission media: Magnetic media, Twisted Pairs, Coaxial Cable, Power Lines, Fiber Optics, Fiber cables – **Wireless Transmission**- Communication Modelling. Digital Modulation and Multiplexing- Public switched telephone network- **Mobile Telephone System**.

UNIT III (15 Hrs)

Data link layer: Design Issues- Error Detection and Correction- Elementary data link protocols- Sliding window protocol. **Multiple Access Protocol-** Ethernet- **Switching.**

UNIT IV (14 Hrs)

Network Layer: **Design Issues-** Routing Algorithms- Congestion Control Algorithm, Quality of Services. **IPV4 Protocol.**

UNIT V (14 Hrs)

Transport Layer: Services –Elements of Transport Protocols- **UDP and TCP protocols,** congestion control. Application Layer: DNS, **electronic mail.**

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Andrew S Tanenbaum	Computer Networks	2014	5 e/d, Pearson Education

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Behrouz A. Forouzan	Data Communications and Networking	2019	5 e/d, Tata McGraw Hill Companies
2.	Jim Kurose and Keith Ross	Computer Networking: A Top-Down Approach	2017	5 e/d, Tata McGraw Hill

PEDAGOGY

Demonstration, Lecture, Group Discussion

COURSE DESIGNERS

1. Dr.. R. Suriyagrace
2. Mrs.T.Prabhakumari

Course Code	Course Name	Course Type	L	T	P	Credits
AI22C12	DEEP LEARNING	THEORY	73	2	-	3

PREAMBLE

This course introduces the concepts of Deep Learning and the various methods of solving problems using deep learning. It also provides insights on deep learning techniques and its applications.

PREREQUISITE

Machine Learning Concepts

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge level
CLO1	Recall the principles of Deep Learning	K1
CLO2	Understand problem solving techniques for complex problems	K2
CLO3	Apply neural network, recurrent neural network and deep network techniques in real time applications	K3
CLO4	Analyze various real-world problems to find suitable solutions using deep learning.	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	L	L	M
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	S	M	L

S- Strong; M-Medium; L-Low

DEEP LEARNING(AI22C12) – [73 Hrs]

UNIT I (15 Hours)

What is deep learning ? : Artificial intelligence, Machine learning, Deep learning - Why Deep Learning ? - Why now ? - A brief history of Machine Learning - Four branches of Machine Learning - Evaluating Machine Learning models - Data pre-processing, feature engineering and feature learning - Overfitting and Underfitting - The Universal workflow of machine learning.

UNIT II (15 Hours)

Introduction to Neural Network - The Biological Neuron - Structure - The Perceptron - Multilayer Feed-Forward Networks.- Training Neural Networks - Activation Functions - Loss Functions - Hyper parameters. Defining Deep Learning - Common Architectural Principles of Deep Learning - Future of Deep Learning.

Unit III (15 Hours)

Major Architectures of Neural Networks: Unsupervised Pretrained Networks - Convolutional Neural Networks (CNN) - Biological Inspiration - Intuition - Convolutional Layers - Pooling Layers - Fully Connected Layers - Other Applications of CNN. Recurrent Neural Networks - Modeling the Time Dimension - 3d Volumetric Input - General Recurrent Neural Network Architecture - LSTM Networks - GRU.

Unit IV (15 Hours)

Building Deep Networks : Matching Deep Networks to the Right Problem - The DL4J Suite of Tools - Basic Concepts of the DL4J API - Modeling CSV Data with Multilayer Perceptron Networks - Modeling Handwritten Images Using CNNs - Modeling Sequence Data by Using Recurrent Neural Networks.

Unit V (13 Hours)

Applications of Deep Learning - Large Scale Deep Learning - Computer Vision – Speech Recognition - Natural Language Processing - Other Applications : Deep Learning in Indian Music Analysis – Deep Learning for Ayurvedic Medicine Classification and Recommendation.

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAROF PUBLICATION	PUBLISHERS\ EDITION
1.	Francois Chollet	Deep Learning with Python	2018	Manning Publications Co., Ist Ed.
2.	Josh Patterson & Adam Gibson	Deep Learning : A Practitioners Approach	2017	O'reilly Publications, Ist Ed.
3.	Ian Goodfellow Yoshua Bengio Aaron Courville	Deep Learning	2016	MIT Press, Ist Ed.

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATIO N	PUBLISHERS\ EDITION
1.	Charu C. Aggarwal	Neural Networks and Deep Learning: A Textbook	2018	Springer , 2018, Ist Ed.
2.	Tomasz Jachimek and Arvind Bhardwaj	Deep Learning with Deeplearning4j: A Practical Approach to Building AI Applications	2019	Packt Publishing, Ist Ed.
3.	Daniel Jurafsky and James H. Martin	Speech and Language Processing.	2022	Perason, IIIrd Ed.

PEDAGOGY

Demonstration, Lecture, Group Discussion

COURSE DESIGNERS

1. Dr.. R. Suriyagrace
2. Mrs.T.Prabhakumari

Course Code	Course Name	Course Type	L	T	P	Credits
AI22CP09	DEEP LEARNING LAB	Practical	-	-	75	3

PREAMBLE

This course provides exercises to implement deep learning techniques using Python. The lab covers the following exercises.

PREREQUISITE

Machine Learning Concept

Neural Network Techniques

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember the programming concepts of deep learning	K1
CLO2	Understand and examine the fundamental issues with AI and ML applications.	K2
CLO3	Apply machine learning, deep learning, and artificial intelligence approaches to address issues in social computing, healthcare, vision, language processing, speech recognition, and other domains.	K3
CLO4	Analyze real-time problems and identify suitable solution	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	M	M	L	M
CLO2	S	S	M	S	M	L
CLO3	S	S	M	M	L	L
CLO4	S	S	M	S	L	L

S- Strong; M-Medium; L-Low

DEEP LEARNING LAB – II (AI22CP09)

LIST OF EXERCISES

1. a. Design a single unit perceptron for classification of a linearly separable binary dataset without using predefined models. Use the Perceptron () from sklearn.
   b. Identify the problem with single unit Perceptron. Classify using Or-, And and Xor-ed data and analyze the result.
2. Implement the Backpropagation algorithm by using Artificial Neural Network
3. Implement an Image classification model to classify a dataset of images using Deep Feed Forward.
4. Implement CNNs model.
5. Implement RNNs model for generating a sequence of numbers and predict the next number.
6. Implement Transfer Learning model to train and evaluate the modified model.
7. Using Generative Models implement a simple auto encoder to reconstruct images.
8. Implement the concept of Data Augmentation to increase the data size from a single image.
9. Implement the standard LeNet-5 CNN architecture model to classify multi category images.
10. Implement Hyper parameter Tuning for experiments with different rates.
11. Implement Model Deployment to save a trained model as a file.
12. Implement Generative Adversarial Networks to generate realistic Images.

PEDAGOGY

Demonstration, Lecture, Group Discussion

COURSE DESIGNERS

1. Mrs. T. Prabhakumari
2. Dr. S. Meera

Course Code	Course Name	Course Type	L	T	P	Credits
AI22CP10	Full Stack Development Lab	Practical	-	-	75	3

Preamble

This lab course is intended to explore concepts into full stack development through HTML, javascript and NetBeans. It makes the students to learn various designing approaches and techniques to provide a robust UI/UX experience using various software tools to implement web pages, style sheets, forms, events, server side applications.

Prerequisite

HTML & Programming Concepts

Course Learning Outcome

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Create Web Applications Using HTML, Javascript and Java Servelets	K1
CLO2	Apply web design methods to solve problems	K2
CLO3	Analyze the web page design requirements and design web pages.	K3
CLO4	Design and build web application using HTML,Javascript and NetBeans	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4
CLO1	S	M	S	S
CLO2	M	S	M	M
CLO3	S	S	S	S
CLO4	M	M	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Full Stack Development Lab (AI22CP10)

1) Exercise to create a HTML Form for user registration and handle the data using a Java Servlet. Store the submitted data temporarily in a JavaBean.

2) Exercise to create a dynamic web page to display a welcome message dynamically based on user input. Use JSP scripting elements and expressions.

3) Exercise to implement form validation on client-side and server-side for a login page using JavaScript and Java Servlet.

4) Exercise to develop student management system to perform CRUD operations (Create, Read, Update, Delete) on a student database using JDBC.

5) Exercise to create a login system with a database (MySQL) to verify user credentials using Java Servlets and JDBC.

6) Exercise to design a feedback form and store the responses in a database. Retrieve and display the feedback on an admin page using JSP.

7) Exercise to develop a small web application using the Model-View-Controller (MVC) architecture in NetBeans.

8) Exercise to create a web application that allows users to upload files to the server. Display the uploaded files on a webpage.

9) Exercise to implement chatbot integration by using a pre-trained AI chatbot API (e.g., Dialogflow or Rasa) and integrate it with a Java web application using NetBeans.

10) Exercise to build a movie or product recommendation system using collaborative filtering (processing in Python) and integrate it with Java web pages.

11) Exercise to deploy one of the application (e.g., Student Management System) on Apache Tomcat using NetBeans.

PEDAGOGY

Demonstrations

COURSE DESIGNERS

1. Dr. S.Meera
2. Mrs. S.Shanthi

Course Code	Course Name	Course Type	L	T	P	Credits
AI21SBP4	SKILL BASED SUBJECT IV: DATA ANALYTICS TOOLS	Practical	-	4	41	3

PREAMBLE

This course introduces the methods for data preparation and data understanding**.** It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.

PREREQUISITE

- Statistics
- Data Mining

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts in python with EDA and Google analytics	K1
CLO2	Understand the fundamentals of Google analytics event tracking and methods of data preprocessing	K2
CLO3	Apply basic statistics in the dataset and visualize the data using basic graphs and plots	K3
CLO4	Analyze the techniques of data exploration for sample data sets by choosing appropriate methods	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S- Strong; M-Medium; L-Low

SBS IV: DATA ANALYTICS TOOLS (AI21SBP4)

LIST OF EXERCISES

Google Analytics

- Exercises to find total number of users, new users, page views, pages per session, average session duration, bounce rate for the given website
- Exercises to find the percent of users that are new visitors versus returning visitors, the number of users and their percentages for the top 3 languages in the specific website
- Generation of data acquisition report for the different channels of the website
- Exercises to analyze the sources / mediums of producing the lowest bounce rate for the website.
- Exercises to find the highest page views in the website.
- Exercises to find the traffic percentage of search items in the website.

Text Analytics using KNIME

- Exercises to implement pre-processing of text data
- Exercises to implement transformation of text data
- Exercises to implement classification of text data
- Exercise s to implement visualization of text data
- Exercises to implement clustering of text data

PEDAGOGY

Demonstration

COURSE DESIGNERS

1. Ms.M.Loganayaki
2. Dr.S.Meera

Course Code	Course Name	Course Type	L	T	P	Credits
AI21AC3	AI FOR ANALYTICS	Theory	-	-	-	5**

PREAMBLE

To expose the student to gain knowledge in the fundamental concepts of Artificial Intelligence and its applications.

PREREQUISITE

Machine Learning
Foundation of data science

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Remember various domain areas and identify the scope of predictive analytics	K1
CLO2	Understand the concepts and techniques of AI and predictive analytics in various domain areas	K2
CLO3	Apply the techniques of AI and perform predictive analytics for simple applications	K3
CLO4	Analyze the challenges in various applications domains	K4

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	L	L
CLO2	S	S	S	M	L	L
CLO3	S	S	S	M	L	L
CLO4	S	S	S	M	L	L

S – Strong; M – Medium; L – Low

AI FOR ANALYTICS (AI21AC3)

UNIT I

Analytics and AI Strategy for Business Transfer :Re-engineering Business to think AI and Analytics – Robust Data Monetization Strategy – Accelerated Decision-making with Real-Time Analytics – Analytics as a Service Model – Analytics-Led Enterprise Transformation.

UNIT II

Banking Industry Transformed by Analytics and AI : Redefining Banking Industry – AI powered financial services – Fraud Mitigation through AI – Reorienting Customer Retention and Risk Management – Advantage of AI in Fintech Companies – AI-Driven Transformations in Insurance – Adopting Digital Based Insurance Model.

UNIT III

Redefining Healthcare and Life Sciences :AI adoption in Healthcare – Real-world Evidence Based Analytics improving Treatment outcomes – Leveraging Patient and Drug similarity Analytics – AI : A Boon to the Life Science Industry – Analytics and Genomics.

UNIT IV

Analytics and AI in Retail: AI-powered shopping experience – Emergence of Smart Consumers – Recommendation Engines for Personalizing Experiences – Evolution of Smart Retailers – Omni channel Experiences – Fluid Supply Chain Transformation.

UNIT V

Exponential Technologies underpinned by Analytics and AI: Beating Cyber-attacks with Analytics – Connected Car Technology reshaping Automotive Industry – IoT Analytics – Crypto currency Analytics – Chatbots – Redefining the Talent Landscape.

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Sameer Dhanrajani	AI and Analytics Accelerating Business Decisions	2018	Wiley Publications

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Stuart Russel and Peter Norvig	Artificial Intelligence – A Modern Approach	2011	Pearson Education Press
2.	Deep Learning Nils J. Nilsson,	Artificial Intelligence: A new Synthesis	2002	Morgan Kaffman,

PEDAGOGY

Lectures, Case Studies, Group Discussions.

COURSE DESIGNERS

1. Dr. S. Meera
2. Dr. R.Suriyagrace

Course Code	Course Name	Course Type	L	T	P	Credits
AP16AC4	INTERNET OF THINGS	Theory	-	-	-	5**

PREAMBLE

To understand the fundamentals of Internet of Things and to build a small low cost embedded system using Raspberry Pi or equivalent boards. To apply the concept of Internet of Things in the real world scenario

COURSE LEARNING OUTCOMES

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts and characteristics of IoT	K1
CLO2	Understand the Use of Devices, methodology and tools in IoT.	K2
CLO3	Examine the applications of embedded systems for conversion, control and automation	K3
CLO4	Apply different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.	K3

MAPPING WITH PROGRAMME LEARNING OUTCOMES

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	M	M	S	L	S	L
CLO2	M	S	M	M	S	L
CLO3	S	M	S	M	S	L
CLO4	S	S	M	S	S	L

S- Strong; M-Medium; L-Low.

INTERNET OF THINGS – (AP16AC4)

UNIT I:

Introduction & Concepts: Introduction to Internet of things- Definition &Characteristics of IoT-Physical Design of IoT- Logical design of IoT – IoT Enabling Technologies – IoT Levels & DePOyment Templates.

UNIT II:

Domain Specific IOTs: Introduction – Home Automation – Cities – Logistics – Agriculture – Industry – Health &Lifestyle. IoT and M2M - IoT systems management with NETCONF-YANG

UNIT III:

IoT Platforms Design Methodology: Introduction – IoT Design Methodology – Case Study – IoT physical Devices & Endpoints: What is an IoT Device – Raspberry Pi Interfaces – Other IoT Devices.

UNIT IV:

IoT Physical Servers & cloud Offerings: Introduction – WAMP – Xively cloud for IoT – Designing a RESTful Web API – Web Services for IoT – IoT Messaging Platform.

UNIT V:

CASE STUDIES and ADVANCED TOPICS: Case Studies Illustrating IoT Design - Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce – Using Apache Storm for Real Time Data Analysis– Tools for IoT.

TEXT BOOK

S.NO.	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	ArshdeepBahga, Vijay Madisetti	Internet of Things – A hands-on approach	2015	Universities Press

REFERENCE BOOK

S.NO	AUTHOR	TITLE OF THE BOOK	YEAR OF PUBLICATION	PUBLISHERS\ EDITION
1.	Manoel Carlos Ramon	API Features and Arduino Projects for Linux Programmers	2014	Apress
2.	Francis daCosta	Rethinking the Internet of Things: A Scalable, Approach to Connecting Everything	2013	1st Edition, Apress Publications
3.	Marco Schwartz	Internet of Things with the Arduino Yun	2014	Packt Publishing