

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**



SILVER JUBILEE INSTITUTION

(Affiliated to Bharathidasan University)

(Accredited by NAAC | An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI – 614016, TAMILNADU, INDIA.

**B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)
(For the candidates admitted in the academic year 2024–2025)**

PROGRAMME CODE

3USAIM



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)
Accredited by NAAC-An ISO 9001:2015 Certified Institution
SUNDARAKKOTTAI, MANNARGUDI-614016.
TAMILNADU, INDIA.

B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED
CURRICULUM FRAME WORK (CBCS–LOCF)
(For the candidates admitted in the academic year 2024–2025)

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses within a programme, maintain national standards and international comparability of learning outcomes and

academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course: is defined as a theory, practical or theory cum practical subject studied in a semester. **Course Outcomes (COs):** are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage. **Programme:** is defined as the specialization or discipline of a Degree. **Programme Outcomes (POs):** Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes. **Programme Specific Outcomes (PSOs):** PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline. **Some important terminologies repeatedly used**

LOCF. Core Courses (CC) A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Non Major Elective (NME). A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10th & 12th std.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement. **Internship:** Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Undergraduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French
/ Sanskrit) Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part –V

Extension activity, Gender studies

EXAMINATION

Continuous Internal

Assessment (CIA): UG -

Distribution of CIA Marks

Passing Minimum: 40 %

Assignment-3 = 30%

Test-2 = 50%

Seminar = 10%

Attendance = 10%

Question Paper

Pattern Part A:

Part A 1 (10X1=10 marks)

One word question/ Fill in/ /True or False/ Multiple Choice Questions Two Questions from Each unit

Part A 2 (5X2=10 marks)

Match the following

Short Answers

One question from Each unit

Total Marks – 20

Part B: (5X5=25

marks) Paragraph

Answers

Either/ or type, One Question from each unit **Part C: (10X3=30)**

Essay Type Answers

Answer 3 out of 5

Questions One

Question from each

unit **Part A: K1 Level**

Part B: K2, K3 and K4 Level

Part C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	25			30		75
Continuous Internal Assessment (CIA)	20	25			30		75

QUESTION PATTERN FOR END SEMESTER EXAMINATION/Continuous Internal Assessment

PART	MARKS
PART –A I. (No choice ,One Mark) TWO questions from each unit (10x1=10) II. (No choice ,Two Mark) ONE question from each unit (5x2 =10)	20
PART -B (Either/ or type ,5-Marks) ONE questions from each unit (5x5 =25)	25
PART -C (3 out of 5) (10 Marks) ONE question from each unit (3x10 =30)	30
Total	75

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION

DURATION: 3. 00 Hours.		Max Mark : 75						
K- LEVELS		K1	K2	K3	K4	K5	K6	Total Marks
PART								
PART –A (One Mark, No choice) (10x=10)		10						10
(2-Marks, No choice) (5x2=10)		10						10
PART –B (5- Marks) (Either/or type) (5x5=25)			5	10	10			25
PART -C (10 Marks) (3 out of 5) (3x10=30) Courses having only K5,K6 levels, K5 level- 3 Questions, K6 level- 2 Questions (One K6 level question is compulsory)						20	10	30
Total		20	05	10	10	20	10	75

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) , respectively. These two are calculated by the following formulae:

$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$	$\text{M}_i \text{ WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses Passed in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

1. For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
2. For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
3. Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
4. A Pass in PART- V will be mandatory although the marks will not count for the

calculation of the CGPA.

5. Absence from an examination shall not be taken as an attempt.

Table-1: Grading of the Courses - UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including previous semester /s is indicated by **Cumulative Grade Point Average (CGPA)**.

Table-3: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

VISION

Attaining Global Recognition in Computer Science Education and to Develop the Software Professionals

MISSION

Imparting Quality Education through a Well – Designed Curriculum in tune with the Challenging Software Needs of the Industry

PROGRAMME OUTCOMES FOR B.Sc., DEGREE

PO No.	Programme Outcomes (Upon completion of this undergraduate programme on B.Sc. Artificial Intelligence and Machine Learning, the students will be able to)
PO-1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor of Science.
PO-2	Critical thinking, Problem Solving and Reflective thinking: think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self awareness and reflexivity of both self and society.
PO-3	Analytical & Scientific Reasoning: evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	Research-related Skills: develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	Digital literacy and Effective Communication: use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas ,books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	Individual and Team Work: effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team.
PO-7	Multicultural Competence and Social Interaction: understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	Awareness of Ethical issues, Human values and Gender Issues: embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	Awareness of Environment and Sustainability: understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-10	Self directed and Lifelong learning: acquire knowledge and skills, including learning “how to learn”, that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes.

Program Specific Outcomes (PSO)

(Upon completion of the B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING Degree Programme, the Undergraduate will be able to)

PSO-1	Understand, analyze and demonstrate the knowledge of human cognition, Artificial Intelligence and Machine Learning in terms of real world problems to meet the challenges of the future.
PSO-2	Understand, analyze and develop essential proficiency in the areas related to artificial Intelligence and Machine Learning in terms of underlying statistical and computational principles and apply the knowledge to solve practical problems.
PSO-3	Learn the basic concepts of Artificial Intelligence and Machine Learning and to apply them to various areas, like Image Processing, Speech Recognition, Product Recommendations, Medical Diagnosis etc.
PSO-4	Develop computational knowledge and project development skills using innovative tools and techniques to solve problems in the areas related to Deep Learning, Machine learning, Artificial Intelligence.
PSO-5	Develop automated solutions for current societal problems using AI & ML computing techniques.
PSO-6	Apply the concepts of Artificial Intelligence and Machine Learning, to analyze, design and develop intelligent systems for Computer Vision, Virtual Reality, Augmented Reality and Natural Language Processing
PSO-7	Solve the complex problems, using latest hardware and software tools, along with analytical skills to arrive at cost effective and appropriate solutions .

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(AUTONOMOUS)

SUNDARAKKOTTAL, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE



B.Sc., Artificial Intelligence & Machine Learning

CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS –LOCF)

(For the candidates admitted in the academic year 2024 – 2025)

ELIGIBILITY: Those who have completed in 10th, +2 examinations with Mathematics as one the core subject

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
I	I	Language Course-I	U24LC101	Pothu Tamil – I TAMILILAKKIYA VARALARU-I	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-I	U24ELC101	General English – I	6	5	1	-	-	3	3	25	75	100
	III	Core Course- I	U24AI101	Programming in C	5	4	1	-	-	5	3	25	75	100
		Core Practical- I	U24AI102P	Programming in C Lab	4	1	-	3	-	4	3	25	75	100
		Allied Course- I	U24AMA101	Statistics	3	2	1	-	-	2	3	25	75	100
		Allied Course- II	U24AMA102	Numerical Analysis	2	1	1	-	-	-	-	-	-	-
	IV	Non Major Elective - I Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level (or) b) Special Tamil if Tamil language was studied up to 10th & 12thstd.			2	1	1	-	-	2	3	25	75	100
		Foundation Course	U24FCAI11	Introduction to Artificial Intelligence & Machine Learning	2	1	1	-	-	2	3	25	75	100
		TOTAL				30	20	7	3	-	21	-	-	-
	II	I	Language Course-II	U24LC202	Pothu Tamil – II TAMILILAKKIYAVARALARU –II	6	5	1	-	-	3	3	25	75
II		English Language Course-II	U24ELC202	General English – II	6	5	1	-	-	3	3	25	75	100
		Core Course- II	U24AI203	Python Programming	5	4	1	-	-	5	3	25	75	100

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
	III	Core Practical- II	U24AI204P	Python Programming Lab	4	1	-	3	-	4	3	25	75	100
		Allied Course-II	U24AMA102	Numerical Analysis	2	1	1	-	-	2	3	25	75	100
		Allied Course – III	U24AMA203	Operations Research	3	2	1	-	-	2	3	25	75	100
	IV	Non Major Elective - II Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level (or) b) Special Tamil if Tamil language was studied up to 10th & 12th std.			2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course-I	U24SEAI21	Web Designing	2	1	1	-	-	2	3	25	75	100
		TOTAL			30	20	7	3	-	23	-	-	-	800
III	I	Language Course-III	U24LC303	Pothu Tamil - III TAMILAZHA VARALARUM PANPADUM III	6	5	1	-	-	3	3	25	75	100
	II	English Language course-III	U24ELC303	General English - III	6	5	1	-	-	3	3	25	75	100
	III	Core Course- III	U24AI305	Java Programming	4	3	1	-	-	4	3	25	75	100
		Core Practical-III	U24AI306P	Java Programming Lab	4	1	-	3	-	4	3	25	75	100
		Allied Course-IV	U24APH301	Applied Physics –I	2	1	1	-	-	2	3	25	75	100
		Allied Practical -I	U24APH302P	Applied Physics Practical	2	-	-	2	-	-	-	--	--	--
	IV	Skill Enhancement Course-II	U24SEAI32	Relational Database Management Systems	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course-III	U24SEAI33	Multimedia Systems	2	1	1	-	-	2	3	25	75	100
	V	Special Course	24UGSC	Health and wellness	2	-	-	2	-	1	-	-	-	-
		TOTAL			30	17	6	7	-	21	-	-	-	700
IV	I	Language Course-IV	U24LC404	Pothu Tamil – IV TAMILUM ARIVIYALUM IV	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-IV	U24ELC404	General English - IV	6	5	1	-	-	3	3	25	75	100
	III	Core Course IV	U24AI407	Artificial Intelligence	5	4	1	-	-	5	3	25	75	100
		Core Practical-IV	U24AI408P	Artificial Intelligence Lab	4	1	-	3	-	4	3	25	75	100
		Allied Course –V	U24APH403	Applied Physics II	3	2	1	-	-	2	3	25	75	100

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
		Allied Practical –I	U24APH302P	Applied Physics Practical	2	-	-	2	-	2	3	25	75	100
	IV	Skill Enhancement Course-IV	U24SEAI44	R Programming	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course –V	U24SEAI45	Mobile Application Development	2	1	1	-	-	2	3	25	75	100
				TOTAL	30	19	6	5	-	23	-	-	-	800
V	III	Core Course- V	U24AI509	Embedded Systems and IOT	6	5	1	-	-	5	3	25	75	100
		Core Course – VI	U24AI510	Operating Systems	5	4	1	-	-	5	3	25	75	100
		Core Course- VII	U24AI511	Robotics	5	4	1	-	-	4	3	25	75	100
		Core Practical- V	U24AI512P	Robotics Lab	4	-	1	3	-	4	3	25	75	100
		Elective Course-I	U24AIE51A/ U24AIE51B/ U24AIE51C	Fuzzy Logic/ Neural Networks/ Pattern Recognition	4	3	1	-	-	3	3	25	75	100
		Elective Course – II	U24AIE52A/ U24AIE52B/ U24AIE52C	Tensor Flow / Ethical Hacking/ Open Source Software	4	3	1	-	-	3	3	25	75	100
	IV	Environmental Studies	24UGCES	Environmental Studies	2	1	1	-	-	2	3	25	75	100
		Internship/ Industrial visit/ Field visit		Internship/ Industrial visit/ Field visit	-	-	-	-	-	2	-	-	-	-
				TOTAL	30	20	7	3	-	28		-	-	700
VI	III	Core Course- VIII	U24AI613	Machine Learning	6	5	1	-	-	4	3	25	75	100
		Core Practical-VI	U24AI614P	Machine Learning Lab	6	-	1	5	-	4	3	25	75	100
		Core Project	U24AIPW	Project with viva- voce/ Group Project	5	-	1	4	-	5	3	25	75	100
		Elective Course-III	U24AIE63A/ U24AIE63B/ U24AIE63C	Natural Language Processing/ Deep Learning/ Computational Intelligence	4	3	1	-	-	3	3	25	75	100
		Elective Course-IV	U24AIE64A/ U24AIE64B/ U24AIE64C	Human Computer Interaction / Data Communication and Network/ Simulation and Modeling	4	3	1	-	-	3	3	25	75	100
	IV	Value Education	24UGVED	Value Education	2	1	-	-	1	2	3	25	75	100
		Professional competency Course	U24PCAI61	Aptitude and reasoning skills for competitive examinations	2	1	1	-	-	2	3	25	75	100
	V	Gender Studies	24UGGS	Gender Studies	1	1	-	-	-	1	3	25	75	100
		Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
				TOTAL	30	14	6	9	1	25	-	-	-	800
				GRAND TOTAL	180	110	39	30	1	141	-	-	-	4500
		*Extra Credit		Value Added Courses (At least One Per Year)						2	-	-	-	-

L-Lecture

T-Tutorial

P-Practical

S-Seminar

Credit Distribution for UG PROGRAMME-Science

S.No	Part	Subject	No. of Courses	Total Credits
1	I	Language Course	4	12
2	II	English Language Course	4	12
3	III	Core Course –Theory	8	37
4		Core Practical	6	24
5		Core Project	1	05
6		Allied Course Theory	5	10
7		Allied Practical	1	02
8	IV	Elective Course	4	12
9		Non-Major Elective	2	04
10		Foundation Course	1	02
11		Skill Enhancement Course	5	10
12		Internship/ Industrial visit/ Field visit	1	02
13		Environmental Studies	1	02
14		Value Education	1	02
15	V	Professional competency Course	1	02
16		Gender Studies	1	01
17		Extension Activity	1	01
18		Special Course	1	01
Total			48	141

Note:

	CIA	ESE
1. Theory	25	75
2. Practical	25	75
3. Separate passing minimum is prescribed for Internal and External marks		

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks[i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Paper
I	IV	NME –I	U24NMEAI11	Fundamentals of Artificial Intelligence
		NME –II	U24NMEAI22	Internet Technology

SEMESTER-V

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(For the Candidates admitted in the academic year 2024 – 2025)



**PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE
III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

Semester: V - CC-V EMBEDDED SYSTEMS AND IOT

Ins. Hrs. /Week: 6

Course Credit: 5

Course Code:U24AI509

UNIT – I EMBEDDED SYSTEMS BASICS (18 Hours)

Embedded System vs General Computing System - Classification of Embedded System, Purpose of Embedded system, Quality Attributes of Embedded System - Typical Embedded System- Core of Embedded System, Memory, Sensors and Actuators, Communication Interface- Onboard communication interface, External communication interface.

UNIT-II FIRMWARE DEVELOPMENT AND CO-DESIGN (18 Hours)

Embedded Firmware Development Languages - Embedded System Development Environment - IDE, Compiler, Linker - Types of File Generated on Cross Compilation-Simulator, Emulator and Debugging- Fundamental issues in Hardware Software Co-design- Integration and Testing of Embedded Hardware and Firmware.

UNIT – III IOT FUNDAMENTALS (18 Hours)

Characteristics - Physical design - protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs. M2M. IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT – IV IOT PLATFORMS AND CLOUD (18 Hours)

Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services. Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks. Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT.

UNIT – V APPLICATIONS AND SECURITY (18 Hours)

Architecture-Smart objects and LLNs-Secure mobility. Home automation – Cities: Smart parking – Environment: Weather monitoring – Agriculture: Smart irrigation – Data analytics for IoT – Software & management tools for IoT cloud storage models & Communication APIs – Cloud for IoT – Amazon Web Services for IoT.

Total Lecture Hours-90

COURSE OUTCOME

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

1. Understand embedded systems architecture, components, and communication interfaces.
2. Apply embedded firmware development and debugging techniques.
3. Analyze IoT architecture, protocols, and design methodologies.
4. Develop IoT applications using Raspberry Pi and Intel Galileo platforms.
5. Evaluate IoT cloud services, smart applications, and data analytics techniques.

TEXT BOOKS

1. Shibu K.V, "Introduction to Embedded System", Tata McGraw-Hill, 2014.
2. Internet of things – A Hands on approach, Arshdeep Bahga, Vijay Madisetti Universities Press, 2015.

REFERENCE BOOK(S)

1. David E. Simon, "An Embedded Software Primer", Pearson Education Asia, Addison Wesley, 2001. Dr. M. Kalaiselvi Geetha, Professor in CSE, FEAT, Annamalai University Page 217
2. Marilyn Wolf, Computers as Components, Principles of Embedded Computing System Design", Morgan Kaufmann Publishers, Third edition, 2012.
3. Manoel Carlos Ramon, "Intel Galileo and Intel Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
4. Marco Schwartz, "Internet of Things with the Arduino Yun", Packet Publishing, 2014.

E RESOURCES

1. <https://s11nk.com/q19r6kb>
2. <https://l1nq.com/swqcv11>
3. <https://www.scribd.com/document/932300441/IOE>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOM ES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V : CC -VI OPERATING SYSTEMS

Ins. Hrs. /Week:5

Course Credit: 5

Course Code: U24AI510

UNIT –I INTRODUCTION

(15 Hours)

Evolution of operating systems- Serial Processing - Batch Processing - Multi Programming- **Functions of OS:** Memory Management Functions - Processor / Process Management Functions - Device Management Functions - Information Management Functions – **Types of Operating Systems:** Batch Operating System- Multi Programming Operating System - Multitasking Operating System - Multi-user Operating System - Multithreading - Time Sharing System - Real Time Systems – Interrupt Structure & processing.

UNIT -II

(15 Hours)

Single Contiguous Allocation- Partitioned Allocation – Relocatable Partitions allocations – Paged Memory Management- Demand paged Memory Management – Page Removal Algorithms -FIFO-LRU- **Virtual Memory Management:** Segmented Memory Management – Segmented and Demand paged Memory Management – Other Memory Management Techniques-overlay Techniques – Swapping.

UNIT -III

(15 Hours)

Job Scheduling –Job Scheduling functions & Policies - Process Scheduling – Process Scheduling Functions and Policies – Evolution of Round Robin Multiprogramming Performance – Process Synchronization – Wait and Signal mechanisms – Semaphores - P & V Operations – Deadlock-Deadlock Prevention-Deadlock Detection- Banker's Algorithm.

UNIT -IV

(15 Hours)

Techniques for Device Management-Dedicated, Shared and Virtual – Device characteristics-Serial Access Devices - Completely Direct Access - Direct Access Storage device- Magnetic disks -Optical Disk-Flash memory - I/O Traffic Controller, I/O Scheduler, I/O Device Handlers – Communication among Devices-Management of I/O Requests.

UNIT- V

(15 Hours)

File system model – Symbolic File System- Basic file system - Access Control verification - General Model of a File System-Sequential Access-Direct/Random Access- Indexed sequential Access-Physical File System and Logical File System - Allocation strategy Module-Device Strategy Modules.

Total Lecture Hours-90

COURSE OUTCOME

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

1. Understand the evolution of operating system
2. Compare and contrast the various memory management schemes
3. Analyze various scheduling algorithm, deadlock prevention and avoidance algorithms
4. Understand the concept of device management
5. Describe the concepts of file management systems

TEXT BOOKS

1. Dhamdhare D.M, System Programming and Operating Systems –Tata McGraw Hill Publishing Co., Limited, New Delhi.
2. Madnick.S.E and Donovan J J 2013, —Operating Systems McGraw Hill International Book Co, New Delhi.

REFERENCE BOOK(S)

1. Dhamdhare .D.M, —Operating Systems: A Concept-Based Approach, McGraw Hill Education; New Delhi.
2. Harvey Deitel M, 1984, —An Introduction to operating system Addison - Wesley Publishing Co. New York.
3. James Peterson.L & Abraham Silberschatz, 1987, —An Introduction to operating system Addison - Wesley Publishing Co. New York.

E-RESOURCES

1. https://www.tutorialspoint.com/operating_system/index.htm
2. <http://www.ddegjust.ac.in/studymaterial/mca-5/mca-105.pdf>
3. <https://surl.li/ahslol>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURS E	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V –CC- VII ROBOTICS

Ins. Hrs. /Week: 5

Course Credit: 4

Course Code:U24AI511

UNIT – I INTRODUCTION

(15 Hours)

Robot - Definition - Robot Anatomy - Coordinate Systems, Work Envelope Types and Classification- Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT-II ROBOT DRIVES AND GRIPPERS

(15 Hours)

Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic-Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT – III SENSORS AND MACHINE VISION

(15 Hours)

Requirements of a sensor, Principles and Applications of the following types of sensors- Position sensors - Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, pneumatic Position Sensors, Range Sensors Triangulations Principles, Structured, Lighting Approach, Time of Flight, Range Finders, Laser Range Meters, Touch Sensors, binary Sensors., Analog Sensors, Wrist Sensors, Compliance Sensors, Slip Sensors, Camera, Frame Grabber, Sensing and Digitizing Image Data- Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms, Applications- Inspection, Identification, Visual Servoing and Navigation.

UNIT – IV ROBOT KINEMATICS AND PROGRAMMING

(15 Hours)

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages- VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT – V INDUSTRIAL ROBOTICS AND APPLICATIONS

(15 Hours)

RGV, AGV; Implementation of Robots in Industries-Variou Steps;
Safety Considerations for Robot Operations - Economic Analysis of
Robots.

Total Lecture Hours-75

COURSE OUTCOME

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

1. Understand robot anatomy, coordinate systems, specifications, and applications of robots.
2. Apply different robotic drives and gripper mechanisms for industrial operations.
3. Analyze robotic sensors, vision systems, and image processing techniques.
4. Develop robot kinematics, dynamics, and programming for manipulator control.
5. Evaluate robot implementation, safety measures, and economic aspects in industries.

TEXT BOOK

1. Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”, Prentice Hall, 2003.

REFERENCE BOOK(S)

1. Groover M.P., “Industrial Robotics -Technology Programming and Applications”, McGraw Hill, 2001.
2. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
3. Rajput R.K., “Robotics and Industrial Automation”, S.Chand and Company, 2008.

E RESOURCES

1. <https://sl1nk.com/tj7ikz7>
2. <https://l1nq.com/o27o0hw>
3. <https://sl1nk.com/35twm2q>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCO MES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V -CP -V ROBOTICS LAB

Ins. Hrs. /Week: 4

Course Credit:4

Course Code:U24AI512P

EXERCISES

1. Determination of maximum and minimum position of links.
2. Verification of transformation (Position and orientation) with respect to gripper and world coordinate system
3. Estimation of accuracy, repeatability and resolution.
4. Robot programming and simulation for pick and place
5. Robot programming and simulation for Colour identification
6. Robot programming and simulation for Shape identification
7. Robot programming and simulation for machining (cutting, welding)
8. Robot programming and simulation for writing practice
9. Robot programming and simulation for any industrial process (Packaging, Assembly)
10. Robot programming and simulation for multi process.

COURSE OUTCOMES

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

1. Determine the maximum and minimum positions of robotic links.
2. Verify robot transformation with respect to gripper and world coordinate systems.
3. Estimate robot accuracy, repeatability, and resolution.
4. Develop robot programs for pick-and-place operations and industrial applications.
5. Analyze robot simulation for colour, shape identification, machining, and multiprocess tasks.

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V – EC- IA FUZZY LOGIC

Ins. Hrs. /Week:4

Course Credit: 3

Course Code:U24AIE51A

UNIT I INTRODUCTION TO FUZZY LOGIC

(12 Hours)

Introduction -Different faces of imprecision - inexactness, Ambiguity, Undecidability, Fuzzyness and certainty, Fuzzy sets and crisp sets, Probability and fuzzy logic, Fuzzy control and knowledge based systems .

UNIT II FUZZY SETS AND OPERATIONS

(12 Hours)

Fuzzy Sets and Operations Impressive concepts, Fuzzyness and imprecision, Properties of fuzzy sets, Fuzzy representation, Conventional set operations, Intersection of Fuzzy sets, Union of fuzzy sets, the complement of fuzzy sets.

UNIT III FUZZY REASONING AND DEFUZZIFICATION

(12 Hours)

Fuzzy Reasoning Linguistic variables, Fuzzy propositions, Fuzzy compositional rules of inference-the-Min-Max rules implications and fuzzy additive rules of implication, Methods of decompositions and defuzzification -composite moments, composite maximum average of maximum values and centre of maximums.

UNIT IV FUZZY SYSTEM METHODOLOGY

(12 Hours)

Methodology of Fuzzy Systems Direct and Indirect methods with single and multiple experts, Construction from sample data - Least square method, adaptive fuzzy controllers - membership function tuning using gradient decent.

UNIT V APPLICATIONS OF FUZZY SYSTEMS

(12 Hours)

Applications Fuzzy controllers - a fuzzy steam turbine controller, DC motor speed control, Fuzzy decisions making, neuro fuzzy systems, fuzzy genetic algorithms.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the concepts of fuzzy logic, imprecision, and uncertainty in intelligent systems.
2. Apply fuzzy set operations and properties in problem representation.
3. Analyze fuzzy reasoning, inference rules, and defuzzification methods.
4. Develop fuzzy systems and adaptive fuzzy controllers using suitable methodologies.
5. Evaluate fuzzy controllers, neuro-fuzzy systems, and fuzzy genetic algorithms in real-world applications.

TEXT BOOKS

1. Zimmermann H.J., 'Fuzzy Set Theory - and its Applications', Springer, 4th Ed., 2007
2. Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', Wiley Publications, 4th Ed., 2016

REFERENCE BOOK(S)

1. John Yen, Reza Langari, 'Fuzzy Logic, Intelligence, Control & Information', Pearson Education Inc., India, 2007
2. George J Klir and Bo Yuan, 'Fuzzy Sets and Fuzzy Logic: Theory and A: Theory and Applications', Pearson, 2015
3. M. Mitchell, 'Introduction to Genetic Algorithms', Indian Reprint, MIT press Cambridge, 2nd Ed, 2014.

E RESOURCES

1. <https://11nq.com/8jbxgpm>
2. <https://ouc.ai/yuzhibin/slides/AI/lecture3.pdf>
3. <https://www.pvpsiddhartha.ac.in/autonomous20/41/ECE/20EC4701E.pdf>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOM	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)**M-Medium (2)****L-Low (1)**

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V -EC IB NEURAL NETWORKS

Ins. Hrs. /Week: 4

Course Credit:3

Course Code: U24AIE51B

UNIT – I INTRODUCTION TO NEURAL NETWORKS (12 Hours)

Introduction: What is a Neural Networks:-Artificial Neural Networks- Biological Neural Networks- Where are neural nets being used? - Signal Processing-Control-Pattern Recognition- Medicine- Speech Production- Speech Recognition-Business.

UNIT –II NEURAL NETWORK ARCHITECTURES AND TRAINING (12 Hours)

How Are Neural Networks Used- Typical Architectures -Setting the Weights-Supervised training – unsupervised training – Fixed-weight nets-Common Activation Functions.

UNIT – III HISTORY AND MCCULLOCH-PITTS MODEL (12 Hours)

Developing Neural Networks: The 1940s: The Beginning of Neural Nets- The 1950s and 1960s: The First Golden Age of Neural Networks-The 1970s The Quiet years-The 1980s Enthusiasm. When Neural Nets Began?-The McCulloch-Pitts Neuron: Architecture-Algorithm-Applications.

UNIT – IV PATTERN CLASSIFICATION USING NEURAL NETWORKS (12 Hours)

Simple Neural Nets for Pattern classification-General Discussion: Architecture-Biases and Thresholds-Linear separability - Data Representation.

UNIT – V HEBB NET, PERCEPTRON, ADALINE AND MADALINE (12 Hours)

Hebb Net:-Algorithm - Application. Perceptron – Architecture – Algorithm - Application Adaline: Architecture – Algorithm – Applications - Madaline.-Architecture - Algorithm-Applications.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the concepts, architecture, and applications of artificial neural networks.
2. Illustrate neural network training methods, architectures, and activation functions.
3. Examine the development and working principles of neural network models.
4. Construct simple neural networks for pattern classification and data

representation.

5. Compare Hebb Net, Perceptron, Adaline, and Madaline models for neural computing applications.

TEXT BOOK

1. Faurett, L. V. (1993). Fundamentals of neural networks: Architectures, algorithms and applications: United States edition. Pearson.

REFERENCE BOOK(S)

1. Rajasekaran, S., & Pai, G. A. V. (2007). Neural networks, fuzzy logic, and genetic algorithms: Synthesis and applications. New Delhi: Prentice Hall.
2. Haykin, S. S. (1994). *Neural networks: A comprehensive foundation*. Macmillan.
3. Valluru, S. K., & Rao, T. N. (2010). *Introduction to neural networks, fuzzy logic & genetic algorithms*. Jaico Publishing House.

E RESOURCES

1. <https://11nq.com/arouz0e>
2. <https://11nq.com/093r19c>
3. <https://s11nk.com/jlwxfn3>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURS E OUTCO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
C01	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
C02	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
C03	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
C04	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
C05	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V- EC -IC PATTERN RECOGNITION

Ins. Hrs. /Week: 4

Course Credit: 3

Course Code: U24AIE51C

UNIT I FUNDAMENTALS OF PATTERN RECOGNITION (12 Hours)

Pattern Recognition Overview: Pattern recognition, Classification and Description-Patterns and feature Extraction with Examples-Training and Learning in PR systems-Pattern recognition Approaches.

UNIT II STATISTICAL PATTERN RECOGNITION (12 Hours)

Statistical Pattern Recognition: Introduction to statistical Pattern Recognition-supervised Learning using Parametric and Non-Parametric Approaches.

UNIT III LINEAR CLASSIFIERS AND CLUSTERING (12 Hours)

Linear Discriminant Functions and Unsupervised Learning and Clustering: Introduction-Discrete and binary Classification Problems-Techniques to directly Obtain linear Classifiers - Formulation of Unsupervised Learning Problems-Clustering for unsupervised learning and classification.

UNIT IV SYNTACTIC PATTERN RECOGNITION (12 Hours)

Syntactic Pattern Recognition: Overview of Syntactic Pattern Recognition-Syntactic recognition via parsing and other grammars-Graphical Approaches to syntactic pattern recognition-Learning via grammatical inference.

UNIT V NEURAL PATTERN RECOGNITION (12 Hours)

Neural Pattern Recognition: Introduction to Neural Networks-Feed forward Networks and training by Back Propagation-Content Addressable Memory Approaches and Unsupervised Learning in Neural PR.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Know the fundamentals, approaches, and feature extraction methods in pattern recognition.
2. Understand the statistical pattern recognition using parametric and non-parametric approaches.
3. Examine linear discriminant functions, clustering, and unsupervised learning techniques.
4. Interpret syntactic pattern recognition using parsing, grammars, and graphical approaches.
5. Compare neural network models and learning methods in neural pattern recognition

TEXT BOOK

1. Robert Schalkoff, "Pattern Recognition: Statistical Structural and Neural Approaches", John Wiley & Sons.

REFERENCE BOOK(S)

1. Earl Gose, Richard Johnsonbaugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India, Pvt Ltd, New Delhi.
2. Duda R.O., P.E.Hart & D.G Stork, "Pattern Classification", 2nd Edition, J.Wiley.
3. Duda R.O. & Hart P.E., "Pattern Classification and Scene Analysis", J.Wiley.
4. Bishop C.M., "Neural Networks for Pattern Recognition", Oxford University Press.

E RESOURCES

1. <https://sllnk.com/eu8imi6>
2. <https://www.aitskadapa.ac.in/img/pdf/ML.pdf>
3. <https://pg.its.edu.in/sites/default/files/AI%20Unit%205.pdf>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURS E	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)**M-Medium (2)****L-Low (1)**

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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**PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE
III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

Semester: V – EC-IIA TENSOR FLOW

Ins. Hrs. /Week:4

Course Credit: 3

Course Code:U24AIE52A

UNIT I TENSORFLOW FUNDAMENTALS AND BASICS

(12 Hours)

Introduction to Artificial Intelligence, Machine Learning, and Deep Learning. Overview of TensorFlow and its features, applications, and architecture. Installation and configuration of TensorFlow environment. Python programming basics required for TensorFlow. Concepts of tensors, variables, constants, operators, and tensor manipulation. Computational graphs and eager execution. TensorFlow execution model, TensorBoard visualization, and introduction to Keras API for building machine learning models.

UNIT II DATA PROCESSING AND NEURAL NETWORKS

(12 Hours)

Data preprocessing techniques, dataset loading and management using TensorFlow Data API. Feature engineering and data transformation methods. Fundamentals of Artificial Neural Networks (ANN), neuron model, layers, and network architecture. Activation functions, loss functions, optimizers, gradient descent, forward propagation, and backpropagation. Model compilation, training, validation, performance evaluation, and overfitting prevention techniques.

UNIT III DEEP LEARNING AND CNNs

(12 Hours)

Introduction to Deep Learning and Convolutional Neural Networks (CNN). Convolution operations, pooling layers, padding, and feature extraction methods. Image preprocessing and augmentation techniques. Building image classification models using TensorFlow and Keras. Transfer learning concepts and implementation using pre-trained models. Applications of TensorFlow in computer vision, object recognition, and image analysis.

UNIT IV RNNs AND NATURAL LANGUAGE PROCESSING

(12 Hours)

Introduction to sequence modeling using Recurrent Neural Networks (RNN). Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) architectures. Time-series forecasting and sequential data processing techniques. Fundamentals of Natural Language Processing (NLP), text preprocessing, tokenization, and word embeddings. Text classification, sentiment analysis, attention mechanisms, and introduction to Transformer models using TensorFlow.

UNIT V ADVANCED TENSORFLOW APPLICATIONS AND DEPLOYMENT

(12 Hours)

Custom layers and model creation in TensorFlow. Hyperparameter tuning and model optimization techniques. TensorFlow Lite and TensorFlow Serving for mobile and web deployment. Distributed training and cloud-based TensorFlow applications. Introduction to Generative Adversarial Networks (GANs), Autoencoders, and advanced deep learning models. Ethical considerations in

Artificial Intelligence, real-world case studies, and mini-project development using TensorFlow.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Outline TensorFlow architecture, tensors, computational graphs, and Keras-based model development.
2. Illustrate data preprocessing, neural network architectures, and model training techniques in TensorFlow.
3. Design deep learning models using convolutional neural networks for image analysis applications.
4. Interpret sequence models, natural language processing techniques, and Transformer architectures using TensorFlow.
5. Assess advanced TensorFlow applications, deployment methods, and ethical aspects of artificial intelligence.

TEXT BOOKS

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow – Aurélien Géron, O'Reilly Publications.
2. Machine Learning with TensorFlow – Nishant Shukla, Manning Publications.

REFERENCE BOOK(S)

1. Deep Learning with Python – François Chollet, Manning Publications.

E RESOURCES

1. <https://11nq.com/wp79r7m>
2. <https://s11nk.com/uignb7g>
3. <https://hal.science/hal-03957224v2/document>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COU RSE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)



PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V – **EC- II B ETHICAL HACKING**

Ins. Hrs. /Week: 4

Course Credit: 3

Course Code: U24AIE52B

UNIT I FOOTPRINTING AND ENUMERATION

(12 Hours)

Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring.

UNIT II SYSTEM AND SERVICE SECURITY

(12 Hours)

Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local access, After hacking root.

UNIT III VPN AND NETWORK DEVICE HACKING

(12 Hours)

Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, Brute-Force Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.

UNIT IV WIRELESS SECURITY AND DOS ATTACKS

(12 Hours)

Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS.

UNIT V WEB HACKING AND COUNTERMEASURES

(12 Hours)

Remote Control Insecurities, Discovering Remote Control Software, Connection, Weakness. VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand footprinting, scanning, enumeration, and network reconnaissance techniques.
2. Apply file, folder, registry, and service security mechanisms in Windows and Unix systems.
3. Analyze dial-up, VPN, PBX, voicemail, and network device security vulnerabilities.
4. Develop knowledge of wireless security threats, firewall vulnerabilities, and denial-of-service attacks.
5. Evaluate remote control insecurities, web hacking techniques, and countermeasures for cyber threats.

TEXT BOOKS

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
2. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.

REFERENCE BOOK(S)

1. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 5th Edition, Tata Mc Graw Hill Publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking". Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback (January 27, 2011)

E RESOURCES

1. <https://11nq.com/tq44gif>
2. <https://11nq.com/hdcm72j>
3. <https://11nq.com/0szocfl>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURS E OUTCOM	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: V - EC-IIC OPEN SOURCE SOFTWARE

Ins. Hrs. /Week:4

Course Credit: 3

Course Code: U24AIE52C

UNIT – I OPEN SOURCE AND LINUX FUNDAMENTALS (12 Hours)

Introduction to open sources–Need of open sources–advantages of open sources – application of open sources. Open source operating systems: LINUX: Introduction – general overview –Kernel mode and user mode–process–advanced concepts –scheduling–personalities–cloning–signals–development with Linux.

UNIT – II MySQL DATABASE PROGRAMMING (12 Hours)

MySQL: Introduction –setting up account –starting, terminating and writing your own SQL programs -record selection Technology – working with strings – Date and Time – sorting Query results – generating summary – working with meta data–using sequences–MySQL and Web.

UNIT – III PHP WEB PROGRAMMING (12 Hours)

PHP: Introduction–programming in web environment–variables- constants– data types – operators –statements – functions – arrays – OOP – string manipulations and regular expression – file handling and data storage–PHP and SQL database–PHP and LDAP – PHP connectivity – sending and receiving E-mails –debugging and error handling–security–templates.

UNIT – IV PYTHON PROGRAMMING FUNDAMENTALS (12 Hours)

Syntax and style– python objects – numbers – sequences–strings–lists and tuples–dictionaries–conditional loops–files–input and output–errors and exceptions–functions–modules–classes and OOP – execution environment.

UNIT – V PERL PROGRAMMING BASICS (12 Hours)

Pearl back grounder – pearl overview–pearl parsing rules–variables and data–statements and control structures– subroutines-,packages and modules–working with files– data manipulation.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand open-source concepts, Linux architecture, and process management techniques.
2. Apply MySQL database operations, query processing, and web integration techniques.

3. Analyze PHP programming concepts, database connectivity, and web application development.
4. Develop Python programs using object-oriented concepts, file handling, and exception management.
5. Evaluate Perl programming structures, modules, and data manipulation techniques.

TEXT BOOKS

1. Remy Card, Eric and Frank Mevel, The Linux Kernel Book, Wiley Publications, 2003.
2. Steve Suchring, John, MySQL Bible, Wiley, 2002.
3. Rasmus Lerdorf and Levin Tatroe, Programming PHP, O Reilly, 2002

REFERENCE BOOK(S)

1. Wesley J. Chun, Core Python Programming, Prentice Hall, 2001
2. Martin C. Brown, Perl: The Complete Reference, 2nd Edn, TMH, 2009
3. Vikram Vaswani, MySQL: The Complete Reference, 2nd Edn, TMH, 2009

E RESOURCES

1. <https://github.com/thevkrant/MySQL-Notes>
2. <https://www.w3schools.com/php/>
3. <https://sllnk.com/frxqmu8>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COUR SE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PS01	PS02	PS03	PS04	PS05	PS06	PS07
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3		3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3		3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

ENVIRONMENTAL STUDIES

Ins. Hrs. /Week:2

Course Credit:2

Course Code:24UGCES

Unit: 1 The Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness (2 lectures)

Unit: 2 Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies.

Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification. (8 lectures)

Unit: 3 Ecosystems

□ Role of an individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles

- Concept of an ecosystem.

- Structure and function of an ecosystem.

- Producers, consumers and decomposers

- Energy flow in the ecosystem

- Ecological succession.

- Food chains, food webs and ecological pyramids

- Introduction, types, characteristic features, structure and function of the following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit: 4 Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man- wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Biological Diversity Act 2002/ BD Rules, 2004 (8 lectures)

Unit: 5 Environmental

Pollution Definition

Causes, effects and control measures of :

- a. Air Pollution
- b. Water Pollution
- c. Soil Pollution
- d. Marine Pollution
- e. Noise pollution
- f. Thermal Pollution
- g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution Pollution case studies

Disaster management: floods, earthquake, cyclone and landslides.

Ill-Effects of Fireworks: Firework and Celebrations, Health

Hazards, Types of Fire, Firework and Safety (8 lectures)

Unit: 6 Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

Unit: 7 Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

- References:
1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
 2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, India,
E-mail: mapin@icenet.net(R)
 3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
 4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB) 5.
Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
 6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
 7. Down to Earth, Centre for Science and Environment (R)
 8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security.
Stockholm Env. Institute Oxford University, Press 473p.
 9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
 10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press
1140 p.
 11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws
Himalaya Pub. House, Delhi
284 p.
 12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions,
Web enhanced

edition 639 p.

13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
 14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
 15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
 16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
 17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
 18. Survey of the Environment, The Hindu (M).
 19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
 20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards,
Vol. I
and II, Enviro Media (R).
 21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
 22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA
- (M) Magazine (R) Reference (TB) Textbook
23. <http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf>.

SEMESTER-VI

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI –CC- VIII MACHINE LEARNING

Ins. Hrs. /Week:6

Course Credit: 4

Course Code:U24AI613

UNIT – I INTRODUCTION TO MACHINE LEARNING (18 Hours)

Introduction: Introduction, easy for human hard for machines, a simple predicting machine, classifying is not very different from predicting, training a simple classifier, one classifier is not enough, Types of machine learning, Applications of Machine Learning, Perspectives and issues in machine learning.

UNIT – II PROBABILISTIC LEARNING MODELS (18 Hours)

Probabilistic and Stochastic Models: Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models.

UNIT – III SUPERVISED LEARNING TECHNIQUES (18 Hours)

Supervised learning: Introduction, Regression, Linear regression, Classification: Decision trees, k-Nearest Neighbours, Support Vector Machine, Logistic regression, Random Forest. Artificial Neural Network: Introduction, Perceptrons, multi-layer networks and back propagation.

UNIT – IV UNSUPERVISED LEARNING AND DIMENSIONALITY REDUCTION (18 Hours)

Unsupervised learning: Introduction, Supervised vs Unsupervised Cluster Analysis, K-means clustering, Hierarchical clustering. Dimension reduction: Principal Component Analysis, Linear Discriminant Analysis.

UNIT – V MODEL BUILDING AND EVALUATION (18 Hours)

Modelling and evaluation: Building the model, Training a model, evaluating a model, improving a model. Performance metrics - accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition.

Total Lecture Hours-90

COURSE OUTCOME

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

1. Understand the fundamentals, types, applications, and challenges of machine learning.
2. Apply probabilistic models and Bayesian learning techniques for prediction and classification.
3. Analyze supervised learning algorithms and artificial neural network models.
4. Develop unsupervised learning and dimensionality reduction techniques for data analysis.
5. Evaluate machine learning models using performance metrics and validation techniques.

TEXT BOOKS

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, — Machine Learning, Pearson Education.
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014.
3. Tariq Rashid, "Make your own neural network", Create Space Independent Publishing Platform, US 2016, ISBN:978-1-5308-2660-5 .

REFERENCE BOOK(S)

1. Shai Shalev-Shwartz, Shai Ben-David, — Understanding Machine Learning: From Theory to Algorithms, Cambridge University Press.
2. Hastie, R. Tibshirani and J. Friedman, "Elements of Statistical Learning", Springer.

E RESOURCES

1. <https://jnncce.ac.in/jnndemo/aiml/ml/Notes.pdf>
2. <https://sllnk.com/z9fmlq>
3. <https://shorturl.at/fFB58>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
C01	3	3	3	2	2	3	2	3	2	2	3		2	3	3	3	1
C02	3	1	2	3	3	2	2	3	3	3	2		3	2	1	3	3
C03	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
C04	3	3	2	3	2	2	3	2	3	3	2			3	2	3	3
C05	3	3	2	3	3	3	3	3	2	3	2			3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI CP VI MACHINE LEARNING LAB

Ins. Hrs. /Week:6

Course Credit: 4

Course Code: U24AI614P

EXERCISES

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data sets to redasa .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes / API can be used to write the program. Calculate the accuracy, precision, and recall for your dataset.

COURSE OUTCOME

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

1. Implement the FIND-S algorithm for hypothesis generation using training datasets.
2. Apply the Candidate-Elimination algorithm to identify consistent hypotheses from datasets.
3. Develop decision tree models using the ID3 algorithm for data classification.
4. Construct artificial neural networks using the Back Propagation algorithm.
5. Evaluate Naïve Bayesian classifiers using accuracy, precision, and recall measures.

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI- EC- IIIA NATURAL LANGUAGE PROCESSING

Ins. Hrs. /Week:4

Course Credit: 3

Course Code:U24AIE63A

UNIT – I INTRODUCTION TO NLP AND LANGUAGE MODELING (12 Hours)

Introduction: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.

UNIT – II WORD LEVEL ANALYSIS AND POS TAGGING (12 Hours)

Word Level Analysis: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT – III SYNTACTIC ANALYSIS AND PARSING (12 Hours)

Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Tree banks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.

UNIT – IV SEMANTICS AND WORD SENSE DISAMBIGUATION (12 Hours)

Semantics And Pragmatics: Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, sectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT – V DISCOURSE ANALYSIS AND NLP RESOURCES (12 Hours)

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Co-reference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, Word Net, Prop Bank, Frame Net, Brown Corpus, British National Corpus (BNC).

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the fundamentals of natural language processing, language modeling, and text preprocessing techniques.
2. Apply word-level analysis, N-gram models, and part-of-speech tagging techniques. Analyze syntactic parsing, context-free grammars, and probabilistic parsing methods.
3. Develop semantic analysis and word sense disambiguation techniques for language understanding.
4. Evaluate discourse analysis methods and lexical resources used in natural language processing.

TEXT BOOKS

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Breck Baldwin, —Language Processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.

REFERENCE BOOK(S)

1. Richard M Reese, —Natural Language Processing with Java, O_Reilly Media, 2015.
2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python, First Edition, O_Reilly Media, 2009.

E RESOURCES <https://shorturl.at/Q3o0a>

1. <https://shorturl.at/v8v1g>
2. <https://shorturl.at/CFIjx>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

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M-Medium (2)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE
III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI –EC- IIIB DEEP LEARNING

Ins. Hrs. /Week: 4

Course Credit: 3

Course Code: U24AIE63B

UNIT – I FUNDAMENTALS OF NEURAL NETWORKS (12 Hours)

The Neural Network – Limits of Traditional Computing – Machine Learning – Neuron–FF Neural Networks–Types of Neurons –Soft max output layers.

UNIT – II TENSORFLOW BASICS (12 Hours)

Tensor flow–Variables–Operations–Placeholders–Sessions–Sharing Variables– Graphs–Visualization.

UNIT – III CONVOLUTIONAL NEURAL NETWORKS (12 Hours)

Convolution Neural Network – Feature Selection–Max Pooling–Filters and Feature Maps–Convolution Layer–Applications.

UNIT – IV RECURRENT NEURAL NETWORKS (12 Hours)

Recurrent Neural Network –Memory cells–sequence analysis–STM–Memory augmented Neural Networks–NTM–Application.

UNIT – V DEEP LEARNING APPLICATIONS AND OPTIMIZATION (12 Hours)

Deep Learning Applications and Model Optimization – Hyperparameter tuning – Regularization techniques – Dropout and Batch Normalization – Transfer Learning – Model evaluation metrics – TensorFlow model deployment – Applications of Deep Learning in image processing, speech recognition, natural language processing, and predictive analytics.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the fundamentals of neural networks, machine learning, and softmax-based architectures.
2. Apply TensorFlow operations, variables, sessions, and graph visualization techniques.
3. Analyze convolutional neural networks, feature extraction, and pooling techniques for deep learning applications.
4. Develop recurrent neural network models and memory-augmented neural architectures for sequence analysis.
5. Evaluate deep learning optimization methods, deployment techniques, and real-world AI applications.

TEXT BOOKS

1. Nikhil Buduma, Nicholas Locascio, —Fundamentals of Deep Learning: Designing Next Generation Machine Intelligence Algorithms|| O'Reilly Media, 2017.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive computation and Machine Learnings eries ||,MITPress,2017.

REFERENCE BOOK(S)

1. Gibson, Adam, and Patterson, Josh, Deep Learning :A Practitioner's Approach, O'Reilly Media, 2017.
2. Charniak, Eugene, Introduction to Deep Learning, MIT Press, 2019.

E RESOURCES

1. <https://shorturl.at/HlGvR>
2. <https://rb.gy/di8o8d>
3. <https://surl.lt/pmakro>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)



PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI -EC-IIIC COMPUTATIONAL INTELLIGENCE

Ins. Hrs. /Week: 4

Course Credit:3

Course Code: U24AIE63C

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE (12 Hours)

Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm-Game Playing- Alpha-Beta Pruning-Expert systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.

UNIT II LOGIC AND KNOWLEDGE REPRESENTATION (12 Hours)

Proposition Logic — First Order Predicate Logic — Unification — Forward Chaining -Backward Chaining — Resolution — Knowledge Representation — Ontological Engineering — Categories and Objects — Events — Mental Events and Mental Objects — Reasoning Systems for Categories — Reasoning with Default Information — Prolog Programming.

UNIT III FUZZY LOGIC AND NEURAL NETWORKS (12 Hours)

Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal Logic-Temporal Reasoning-Neural Networks-Neuro-fuzzy Inference.

UNIT IV PROBABILISTIC LEARNING AND MACHINE LEARNING (12 Hours)

Probability basics — Bayes Rule and its Applications — Bayesian Networks — Exact and Approximate Inference in Bayesian Networks — Hidden Markov Models — Forms of Learning — Supervised Learning — Learning Decision Trees — Regression and Classification with Linear Models — Artificial Neural Networks — Nonparametric Models — Support Vector Machines — Statistical Learning — Learning with Complete Data — Learning with Hidden Variables- The EM Algorithm — Reinforcement Learning.

UNIT V NATURAL LANGUAGE PROCESSING AND AI APPLICATIONS (12 Hours)

Natural language processing-Morphological Analysis-Syntax analysis-Semantic Analysis-All applications — Language Models — Information Retrieval — Information Extraction — Machine Translation — Machine Learning — Symbol-Based — Machine Learning: Connectionist — Machine Learning.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand artificial intelligence concepts, search techniques, and expert systems.

2. Apply logic-based knowledge representation and reasoning techniques in artificial intelligence.
3. Analyze fuzzy logic, temporal reasoning, and neuro-fuzzy inference systems.
4. Develop probabilistic models and machine learning algorithms for intelligent systems.
5. Evaluate natural language processing techniques and AI-based language applications.

TEXT BOOKS

1. Artificial Intelligence: A Modern Approach – Stuart Russell & Peter Norvig, Pearson Education, 4th Edition, 2021.
2. Artificial Intelligence – Elaine Rich, Kevin Knight & Shivashankar B. Nair, McGraw Hill Education, 3rd Edition.
3. Artificial Intelligence – Eugene Charniak & Drew McDermott, Pearson Education.

REFERENCE BOOK(S)

1. Introduction to Artificial Intelligence and Expert Systems – Dan W. Patterson, Pearson Education.
2. Prolog Programming for Artificial Intelligence – Ivan Bratko, Addison-Wesley.

E RESOURCES

1. <https://surl.lt/pmakro>
2. <https://surl.li/nokqre>
3. <https://surl.li/yhbyou>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI- EC- IVA HUMAN COMPUTER INTERACTION

Ins. Hrs. /Week: 4

Course Credit: 3

Course Code:U24AIE64A

UNIT – I FOUNDATIONS OF HUMAN COMPUTER INTERACTION (12 Hours)

Foundations Of HCI: The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms.

UNIT – II INTERACTIVE DESIGN AND SOFTWARE PROCESS (12 Hours)

Design & Software Process: Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT – III COGNITIVE AND COMMUNICATION MODELS (12 Hours)

Models And Theoretic Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT – IV MOBILE HUMAN COMPUTER INTERACTION (12 Hours)

Mobile HCI: Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies.

UNIT – V WEB INTERFACE DESIGN (12 Hours)

Web Interface Design: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the foundations of human-computer interaction, human factors, and interaction paradigms.
2. Apply interactive design principles, usability engineering, and evaluation techniques in software development.
3. Analyze cognitive models, communication models, and multimedia systems in HCI.
4. Develop mobile HCI applications using mobile platforms, frameworks, and design tools.

- Evaluate mobile application design and user interaction through real-world case studies.

TEXT BOOKS

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, — Human Computer Interaction, 3rd Edition, Pearson Education, 2004.
- Brian Fling, —Mobile Design and Development, First Edition, O'Reilly Media Inc., 2009.
- Bill Scott and Theresa Neil, —Designing Web Interfaces, First Edition, O'Reilly, 2009.

REFERENCE BOOK(S)

- Human Computer Interaction: Fundamentals and Practice Gerard Jounghyun Kim, CRC Press, 2015
- M.G. Helander, Handbook of Human-Computer Interaction, Elsevier Science, 2014.
- Cognitive Behavior and Human Computer Interaction Based on Machine Learning Algorithms, Wiley, 2021.

E RESOURCES

- <https://surl.li/srdlbq>
- <https://surli.cc/ahxbmz>
- <https://surl.li/gwhkiy>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI - EC -IVB DATA COMMUNICATION AND NETWORK

Ins. Hrs. /Week: 4

Course Credit: 3

Course Code: U24AIE64B

UNIT I DATA COMMUNICATION AND NETWORK MODELS (12 Hours)

Data Communications: Introduction– Networks – The Internet – Protocols and Standards-Network Models: OSI model – TCP/IP protocol suite – Transmission Media: Guided media – Unguided Media.

UNIT II DATA LINK LAYER AND ERROR CONTROL (12 Hours)

Data Link Layer: Error Detection and Correction: Introduction- Block coding – Linear block codes – Cyclic Codes – Checksum. Framing – Flow and Error Control: Protocols –Noiseless Channels: Stop- and –Wait – Noisy Channel: Stop-and Wait Automatic Repeat Request-Go-Back –N.

UNIT III MEDIUM ACCESS AND TRANSPORT LAYER (12 Hours)

Medium Access and Network Layer: Multiple Access: Random Access – Controlled access-Channelization. Network Layer Logical addressing: IPv4 addresses – IPv6 addresses. Transport Layer: Process to Process delivery: UDP – TCP. Congestion Control – Quality of Service.

UNIT IV APPLICATION LAYER SERVICES (12 Hours)

Application Layer: Domain Naming System: Name Space - Domain Name Space - Distribution of Name Space - DNS in the INTERNET - Resolution-Remote logging – E-mail – FTP.

UNIT V WIRELESS NETWORKS AND COMMUNICATION (12 Hours)

Wireless Networks: Wireless Communications – Principles and Fundamentals. WLANs – WPAN- Satellite Networks - Ad-hoc Networks.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand data communication concepts, network models, and transmission media.
2. Apply error detection, correction, framing, and flow control techniques in data link layer protocols.
3. Analyze medium access methods, IP addressing, transport protocols, and congestion control mechanisms.
4. Develop application layer services using DNS, e-mail, remote logging, and FTP protocols.
5. Evaluate wireless communication technologies, WLANs, WPANs, satellite,

and ad-hoc networks.

TEXTBOOKS

1. Forouzan, A. Behrouz. (2006), Data Communications & Networking, Fourth Edition, TataMcGraw Hill Education.
2. Nicopolitidis, Petros, Mohammad SalamehObaidat, G. L. Papadimitriou(2018), Wireless Networks, John Wiley & Sons.

REFERENCE BOOK(S)

1. Fred Halsall(1996), Data Communications Computer Networks and Open Systems, Fourth Edition, Addison Wesley.

E- RESOURCES

1. https://www.tutorialspoint.com/data_communication_computer_network/index.html.
2. <https://www.geeksforgeeks.org/data-communication-definition-components-types-channels>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI - EC- IVC SIMULATION AND MODELING

Ins. Hrs. /Week: 4 Course Credit: 3

Course Code: U24AIE64C

UNIT I MODELING AND SIMULATION BASICS (12 Hours)

Introduction To Modeling & Simulation – What is Modeling and Simulation? – Complexity Types – Model Types – Simulation Types – M&S Terms and Definitions
Input Data Analysis – Simulation Input Modeling.

UNIT II RANDOM VARIATE GENERATION (12 Hours)

Random Variate Generation – Random Numbers – Random Number Generators – General principles – Inverse Transform Method –Acceptance Rejection Method – Composition Method – Relocate and Rescale Method - Specific distributions- Output Data Analysis.

UNIT III DISCRETE EVENT SIMULATION (12 Hours)

Comparing Systems via Simulation – Introduction – Comparison Problems - Comparing Two Systems - Screening Problems - Selecting the Best - Comparison with a Standard - Comparison with a Fixed Performance Discrete Event Simulations – Introduction - Next-Event Time Advance.

UNIT IV ENTITY AND DISTRIBUTED MODELING (12 Hours)

Entity Modeling – Entity Body Modeling – Entity Body Visualization – Entity Body Animation – Entity Interaction Modeling – Building Modeling Distributed Simulation – High Level Architecture (HLA) – Federation Development and Execution Process (FEDEP).

UNIT V OPTIMIZATION AND SENSOR MODELING (12 Hours)

Optimization Algorithms – Genetic Algorithms – Simulated Annealing Examples: Sensor Systems Modeling – Human Eye Modeling – Optical Sensor Modeling – Radar Modeling.

Total Lecture Hours-60

COURSE OUTCOME

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

1. Understand the fundamentals, concepts, and types of modeling and simulation systems.
2. Apply random number generation and probability distribution methods in simulation models.
3. Analyze system comparison techniques and discrete event simulation methods.
4. Develop entity modeling, visualization, animation, and distributed simulation architectures.
5. Evaluate optimization algorithms and simulation models for sensor and radar

systems.

TEXT BOOKS

1. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications, and Practice", John Wiley & Sons, Inc., 1998.
2. George S. Fishman, "Discrete-Event Simulation: Modeling, Programming and Analysis", Springer-Verlag New York, Inc., 2001.

REFERENCE BOOK(S)

1. Andrew F. Seila, Vlatko Ceric, Pandu Tadikamalla, "Applied Simulation Modeling", Thomson Learning Inc., 2003.

E RESOURCES

1. <https://surl.li/mqxbmb>
2. <https://surl.li/dfbyyk>
3. <https://surl.li/ahslol>

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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SUNDARAKKOTTAI, MANNARGUDI- 614016

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PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING



PART-IV

VALUE EDUCATION

Ins. Hrs. /Week:2

Course Credit:2

Course Code:24UGVED

UNIT- I: PHILOSOPHY OF LIFE AND SOCIAL VALUES

Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT-II HUMAN VALUES AND CITIZENSHIP

Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education-A P J Kalam's ten points for enlightened citizenship- The role of media in value building

UNIT-III VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT

Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith -Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same- National Integration and International Understanding.

UNIT -IV YOGA AND HEALTH:

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

UNIT V : HUMAN RIGHTS:

Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights- definitions under Indian and

International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty and Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.

UNIT - VI CURRENT CONTOURS: (for continuous internal assessment only):

BOOKS FOR REFERENCES

1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
2. Leah Levin, Human Rights, NBT, 1998
3. V.R. Krishna Iyer, Dialectics and Dynamics of Human Rights in India, Tagore Law Lectures.
4. Yogic Therapy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.SOUND HEALTH THROUGH YOGA
-Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedapatti, 1999.
5. Grose. D. N – “A text book of Value Education’ New Delhi (2005)
6. Gawande . EN – “Value Oriented Education” – Vision for better living. New Delhi (2002) Sarupsons
7. Brain Trust Aliyar- “Value Education for Health, Happiness and Harmony” Erode (2004) Vethathiri publications

COURSE OUTCOME

After completion of the course, the student will be able to:

- Apply the values in thirukural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitudinal to follow the constitutional rights

E-RESOURCES

1. <https://www.learnpick.in/prime/documents/ppts/details/42/structures-in-c>
2. <https://cutt.ly/pbhDNFfx>
3. <http://www.d.umn.edu/~rmaclin/cs1622/Chapter09-10/Chapter09-10.PPT>



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
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PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Semester: VI-PART-IV : Aptitude and Reasoning Skills for Competitive Examinations

Ins. Hrs. /Week:2

Course Credit:2

Course Code:U24PCAI61

UNIT-I COMPUTER ARCHITECTURE

(6 Hours)

Introduction to computer system and architecture- Number System: Digital Codes, Weighted Binary Code, Non-Weighted Binary Code, Alphanumeric Code- Machine Language, Assembly Language, Assembler, Program Loops, Subroutines- Memory Hierarchy.

UNIT-II DATABASE SYSTEMS

(6 Hours)

Database System Concepts and Architecture: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence.- Entity Relationship Diagrams, Relational Model.

UNIT-III OPERATING SYSTEMS

(6 Hours)

Basics of Operating Systems: Operating System Structure, Operations and Services, System Calls-Process Management-Threads-CPU Scheduling-Deadlocks-Memory Management.

UNIT-IV DATA STRUCTURES

(6 Hours)

Introduction to Data Structures-types of data structures- Abstract data types, Arrays and their Applications, Stacks, Queues, Priority Queues, Linked Lists.

UNIT-V CYBER SECURITY

(6 Hours)

Cyber Crime: Introduction to Cyber Crime, Malware type, Kinds of Cyber Crime. Cyber Security Techniques: Authentication, Encryption, Digital Signatures, Antivirus, Firewall, Steganography.

Total Lecture Hours-30

COURSE OUTCOME

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

1. Identify various concepts of computer system architecture
2. Implement the ER Model to Database applications
3. Understand basics of Operating systems
4. Know about Common Data Structures

5. Deploy the Cyber security techniques.

TEXT BOOKS

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
2. Silberschatry, Korth, Sundarshan, "Database system Concepts", Fourth Edition, Mc GrawHill Higher Education
3. Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, Inc., 2004

REFERENCE BOOK(S)

1. E.Horowitz, S.Sahni and Susan Anderson Freed, "Fundamental Data Structures in C", 2ed, Orient BlackSwan Publisher, 2009.
2. Cryptography and Network Security: Principles and Practice (6th Edition), William Stallings, Prentice Hall Press, 2013.

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
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CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

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(For the Candidates admitted in the academic year 2024 – 2025)



PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

PART -V

Gender Studies

Ins. Hrs. /Week:1

Course Credit:1

Course Code:24UGGS

UNIT – I

Concepts of Gender: Sex – Gender – Biological Determinism – Patriarchy – Feminism – Gender Discrimination – Gender Division of labour – Gender Stereotyping – Gender Sensitivity – Gender Equity – Equality – Gender Mainstreaming - Empowerment.

UNIT – II

Women's Studies vs Gender Studies : UGC's Guidelines – VII to XI Plans – Gender Studies : Beijing Conference and CEDAW – Exclusiveness and Inclusiveness.

UNIT – III

Areas of Gender Discrimination : Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment – State Policies and Planning .

UNIT – IV

Women Development and Gender Empowerment : Initiatives – International Women's Decade – International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year 2001 – Mainstreaming Global Policies .

UNIT – V

Women's Movements and Safeguarding Mechanism : In India National /State Commission for Women(NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73rd and 74th Amendment for PRIS

REFERENCES

1. Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited , 2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics , New Delhi: Women Unlimited 2004

3. Bhasin Kamala , What is Patriarchy? : Gender Basics, New Delhi :Women Unlimited ,1993
 4. Pernau Margrit, Ahmad Imtiaz, Reifeld Hermut (ed.),Family and Gender : Changing Values in Germany and India ,New Delhi :Sage Publications,2003
 5. Agarwal Bina, Humphries Jane and Robeyns Ingrid(ed.,) Capabilities , Freedom , and Equality: Amartya Sen's Work from a Gender Perspective,New Delhi : Oxford University Press ,2006
 6. Rajadurai.S.V,Geetha.V,Themes in Caste Gender and Religion, Tiruchirappalli : Bharathidasan University ,2007
 7. Misra Geetanjali, Chandiramani Radhika (ed.,) Sexuality , Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi : Sage Publication ,2005
 - 8.Rao Anupama (ed.,) Gender &Caste : Issues in Contemporary Indian Feminism, New Delhi : Kali for Women, 2003
 - 9.Saha Chandana , Gender Equity and Gender Equality : Study of Girl Child in Rajasthan , Jaipur: Rawat Publication ,2003.
 - 10.Krishna Sumi, (ed.,),Livelihood and Gender : Equity in Community Resource Management, New Delhi : Sage Publication ,2004
 - 11.Pludi.A Michele(ed.,) praefer Guide to the Psychology of Gender ,London : Praeger Publisher ,2004
 - 12.Wharton .S Amy , The Sociology of Gender : An Introduction to Theory and Research , USA : Blackwell Publishing ,2005
 - 13.Mohanty Manoranjan(ed.,) Class ,Caste ,Gender : Readings in Indian Government and Politics – 5,New Delhi : Sage Publications ,2004.
- Arya Sadhna Women ,Gender Equality and the State ,New Delhi :Deep &Deep Publication, 2000

COURSE LEARNING OUTCOME (FOR MAPPING WITH POS AND PSOS)

COURSE OUTCOME S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	2	3	2	3	2	2	3	2	2	3	3	3	1
CO2	3	1	2	3	3	2	2	3	3	3	2	2	3	2	1	3	3
CO3	2	3	3	2	2	3	3	2	3	2	3	3	2	2	3	2	3
CO4	3	3	2	3	2	2	3	2	3	3	2	3	1	3	2	3	3
CO5	3	3	2	3	3	3	3	3	2	3	2	2	3	3	2	3	2

S-Strong (3)

M-Medium (2)

L-Low (1)

VALUE ADDED COURSE



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS),**

SUNDARAKKOTTAI, MANNARGUDI – 614016.

(For the candidates admitted in the academic year 2024 – 2025)

**PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE
III B.Sc., ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

SEMESTER -V VAC-III : ADVANCES IN ROBOTICS AND AUTOMATION

Course Credit:2

Course Code:U24AIVA53

UNIT-I HUMANOID ROBOTICS AND SENSORS

Humanoid Robotics-Introduction, Sensors in Humanoid Robot: Position and motion sensors-Inductive type, Encoders, LVDT, RVDT, Photo electric, Thermoelectric, Capacitive, Linear potentiometer, Strain gauges, Vision Sensors, Touch Sensors, Inertial Measurement Units (IMU), Microphones & Speech Recognition Sensors.

UNIT-II SOCIAL AND ASSISTIVE ROBOTS

Social Robot, Need of Social Robots, Assistive and Social Robots in the Healthcare Sector, Case study on Humanoid Robot- ASIMO, Sophia.

UNIT-III SWARM ROBOTICS

Swarm Robotics: Characteristics, Swarm Robotics and Multi-Robotic Systems, Experimental Platforms in Swarm Robotics, Tasks in Swarm Robotics, Swarm Robots used in Real world applications.

UNIT-IV ELECTRO-PNEUMATIC AND HYDRAULIC AUTOMATION

Electro-pneumatic/Electro hydraulic automation: Control valves – direction, pressure and flow, Basic electrical elements – relay, solenoid, pneumatic – electrical converters.

UNIT-V PLC AND AUTOMATION CONTROL

Automation Control: Sequence control and programmable controllers – logic control and sequencing elements, ladder diagram, PLC, programming the PLC. Practical Examples on PLC ladder programming.

COURSE OUTCOME

1. Understand the humanoid robotics concepts and the operation of various sensors used in humanoid robots.
2. Analyze social and assistive robots and their applications in healthcare using humanoid robot case studies.
3. Understand swarm robotics principles, experimental platforms, and real-world applications of multi-robot systems.
4. Describe electro-pneumatic and electro-hydraulic automation systems and their control components.

5. Develop PLC-based automation programs using ladder diagrams and sequence control techniques.

TEXT BOOKS

1. Introduction to Humanoid Robotics Shuuji Kajita, Hirohisa Hirukawa, Kensuke Harada, Kazuhito Yokoi Springer 2014.
2. An Introduction to Swarm Robotics Iñaki Navarro and Fernando Matía ISRN Robotics 2013 .
3. Industrial Automation and Control S.K. Singh McGraw Hill 3 rd , 2017.

REFERENCE BOOK(S)

1. Swarm Robotics: Principles and Applications Beniamino Siciliano, Oussama Khatib Springer 2016.
2. Programmable Logic Controllers Frank D. Petruzella McGraw Hill 6 th , 2023.