B.Sc ARTIFICIAL INTELLIGENCE

(Choice Based Credit System)

(with effect from the academic year 2022-2023)

Vision of the University

To provide quality education to reach the un-reached

Mission of the University

- To conduct research, teaching and outreach programmes to improve conditions of human living
- To create an academic environment that honours women and men of all races, caste, creed, cultures and an atmosphere that values intellectual curiosity, pursuit of knowledge, academic freedom and integrity.
- To offer a wide variety of off-campus educational and training programs, including the use of Artificial Intelligence.
- To develop partnership with industries and government so as to improve the quality of the workplace and to serve as catalyst for economic and cultural development
- To provide quality/ inclusive education, especially for the rural and un-reached segments of economically downtrodden students including socially oppressed and differently abled

PREAMBLE

The Learning Outcome-based Curriculum Framework (LOCF) approach has been adopted in B.Sc., Artificial Intelligence Programme to create and disseminate knowledge to the students on the latest technologies by imparting the technical skills to meet industrial needs and inculcate the skills for employability at the point of graduation.

Vision

Empowering students with computing knowledge to stay in forefront of state-of-art technologies for rendering the need based services to the society.

Mission

- To impart quality based education by inculcating technical,

entrepreneurship and leadership skills to meet global challenges.

- To enable the students acquire the skill of employability and entrepreneurship.

Programme Educational Objectives (PEOs):

PEO 1: To equip students with the fundamental concepts of Artificial Intelligence.

PEO 2: To help students in getting employment by mastering their skills.

PEO 3: To nurture creative thinking and make the students capable of undertaking innovative practices.

PEO 4: To develop environmental awareness, empowerment of humanity and civic consciousness.

PEO 5: To build the ability to cope with the changing environment

PEO 6: To mould them as responsible citizens by imparting value based education.

Programme Outcomes (POs):

On successful completion of the B.Sc. Artificial Intelligence programme, the graduates will be:

PO 1 Knowledge: Gain in-depth knowledge of software and hardware techniques

PO 2 Problem solving: Ability to critically analyze and provide software solutions for problems

PO 3 Environment and sustainability: Understand the impact of software solutions in environmental and societal context and strive for sustainable development.

PO 4 Team Work: Work in teams to accomplish the objective.

PO 5 Communication Skills: Able to communicate effectively.

Programme Specific Outcomes (PSOs):

PSO 1 Understand and analyze the fundamental knowledge in the Artificial Intelligence domain.

PSO 2 Enhance the logical and analytical thinking to understand the computational systems.

PSO 3 Ability to comprehend the development methodologies of software systems and to design the software solutions.

PSO 4 Explore the developing areas in the Artificial Intelligence sector and to enrich themselves to be skillful to meet the diverse expectations of the industry.

PSO 5 Equipped to be competent in providing optimal and ethical solutions to the technological challenges laid by the professional societies.

REGULATIONS/ PROGRAMME SPECIFIC REQUIREMENTS

Duration of the Course:

B.Sc. Artificial Intelligence is a 3 years full time programme spread over six semesters.

Eligibility for Admission to the Programme

Candidates who have passed any group in HSC areeligible for this programme (as specified in the admission guidelines given by the Directorate of Collegiate Education)

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-UGPG%20Revised%20Guidlines_compressed%20(1).pdf

B.Sc ARTIFICIAL INTELLIGENCE
SEMESTER WISE COURSE STRUCTURE

Sem	Sub No	Subject status	Subject Title	Contact Hrs	Credits
I	1	Part I	Tamil / Other Language	6	4
	2	Part II	Communicative English - I	6	4
	3	Core 1	Computer Fundamentals &Programming in C	5	4
	4	Core Practical 1	C Programming & Computer Basics Lab	4	2
	5	Allied 1	Applied Mathematics	3	3
	6	Mandatory Core	Professional English for Physical Sciences -I	4	4
	7	Part IV	Environmental Studies	2	2
			Sub Total	30	23
II	8	Part I	Tamil / Other Language	6	4
	9	Part II	Communicative English - II	6	4
	10	Part III Core 2	Artificial Intelligence	5	4
	11	Core Practical 2	Prolog Lab	4	2
	12	Allied Practical 2	Internet of Things Lab	3(1 T+2P)	2
	13	Mandatory Core	Professional English for Physical Sciences - II	4	4
	14	Part IV	Value Based Education	2	2
			Sub Total	30	22

Core 1

COMPUTER FUNDAMENTALS & PROGRAMMING IN C

L T P C

COURSE OBJECTIVE:

4 1 0 4

1. To understand the character set and different data types in C
2. To learn the different programming concepts in C
3. To analyze Arraysin C

UNIT I:Computer Basics:
Introduction, Characteristics of Computers - Computer Memory and Storage: Random Access memory (RAM), Read only memory (ROM), RAM. Secondary storage devices: Magnetic disk, optical disks, USB drives.
Computer Program: Introduction – Developing a program – Algorithm – Flowchart
Internet Basics: Introduction - Basic Internet Terms - Getting Connected to Internet - Internet Applications - Electronic Mail - Searching the Web (Search Engines)

Unit – II: INTRODUCTION TO C
C Declarations:- Character Set – C tokens – Keywords and Identifiers – Identifiers – Constants – Variables – Data types – Declaration of Variables – Assigning Values to Variables- – Arithmetic Operators – Relational Operators – Logical Operators – Assignment Operators – Increment and Decrement Operators – Conditional Operator – Bitwise Operators – Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Expressions.
Managing Input and Output Operations:-– scanf( ) – printf( ).

Unit – III: CONTROL STRUCTURES
Decision Making and Branching:- Decision Making with IF Statement – Simple IF statement – The IF...Else Statement – The Switch Statement – The ?: Operator
Decision Making and Looping:- The WHILE Statement – The DO Statement – The FOR statement.

Unit – IV: ARRAYS
One-dimensional arrays – Declaration– Initialization - Two-dimensional arrays – Initialization. Character Arrays and Strings:- Declaring and Initializing String Variables – Reading Strings from Terminal – Writing Strings to Screen – String Handling Functions.

Unit – V: FUNCTIONS
User-Defined functions:- Need– Definition– Return Values and their Types – Function Calls – Function Declaration – Category of functions – No Arguments and No return values – Arguments but No return Values – Arguments with return values – No arguments but a return a value – Recursion.

COURSE OUTCOME:

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

1. Understand the usage of Header files

2. Analyze the use of multi-dimensional arrays

3. Create user defined functions

4. Work with Strings

5. Become a good programmer in C

CO - PO - PSO Mapping

COMPUTER FUNDAMENTALS & PROGRAMMING IN C											
CO	PO					PSO					COGNITIVE LEVEL
	1	2	3	4	5	1	2	3	4	5	
CO 1	S	S	S	M	S	S	M	S	S	S	K - 3
CO 2	S	S	M	S	S	S	S	S	S	S	K - 5
CO 3	S	S	S	M	S	S	S	S	M	S	K - 4
CO 4	S	S	S	S	S	S	M	S	S	S	K - 5
CO 5	S	S	S	M	S	S	S	M	S	S	K – 6

Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L

Text Book:

ProgrammingANSI C4E-EBalagurusamy, TataMcGraw–HillPublishingcompanyLimited.

ReferenceBooks:

1. Schaum'soutlinesProgrammingwithC-
 Byrons.Gottfried,SecondEdition,TataMcGraw–HillpublishingcompanyLimited.

 2. The complete Reference C – Herbert Schildt, Fourth Edition, Tata McGraw-Hill
 Publishing Companylimited.

3. ProgrammingwithANSIandTurboC-AshokN.Kamthane,PearsonEducations.

4. Computer Basics and C Programming by V. Rajaraman – PHI Learning Private Ltd

C PROGRAMMING& COMPUTER BASICS LAB   0 0 4 2

List of C Programs

1. Reverse a number
2. Print Fibonacci series upto n terms
   0 1 1 2 3 5 … … …
3. Check vowel or consonant using switch case statement
4. Check whether a given year is leap year or not
5. Search an element in an array
6. Transpose of a matrix
7. Find the binomial coefficient (nCr) value using recursion
8. Check whether a given string is a palindrome or not

Do the following in **Page Maker**

1. Design ID Card (3" * 2").
2. Preparation of a small booklet with 6 pages (3.5" * 4.5").
3. Create an advertisement for your college.
4. Design a greeting card

Do the following in **a browser**

1. Create email-id
2. Compose an email, send and receive

COURSE OUTCOME:

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

1. Understand the usage of Header files
2. Analyze the use of arrays
3. Create user defined functions
4. Work with Control Structures
5. Become a good programmer

CO - PO - PSO Mapping

C PROGRAMMING LAB											
CO	**PO**					**PSO**					**COGNITIVE LEVEL**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	
CO 1	S	S	S	M	S	S	S	S	S	S	K - 3
CO 2	S	S	M	S	S	S	S	S	S	S	K - 5
CO 3	S	S	S	M	S	S	S	S	M	S	K - 4
CO 4	S	S	S	S	S	S	S	S	S	S	K - 5
CO 5	S	S	S	M	S	S	S	S	S	S	K – 6

Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L

Allied 1   **APPLIED MATHEMATICS**

Course Objective:

1. To understand matrix operations
2. To study the basic operations of Octave

UNIT I: Linear Algebra: Matrix, Representation, Examples of matrix Data, Vectors, examples, Representation, MatrixAddition, Scalar Multiplication, Multiplication properties, Matrix Vector Multiplication, Matrix Multiplication, Inverse and Transpose.

Unit II: Applications of Matrix operations on Real Time Data, Parallel Matrix Multiplication, Dimensionality Reduction by Principal Component Analysis and Eigen Values, Eigen Vectors.

UNIT III Basic operations of Octave: Installation of Octave, Logical & Arithmetic Operations, Assignment of Different Variables, Assigning Matrices, Vector Representation, Histogram of matrices, Diagonal Matrices.

UNIT IV: Data Visualization and Processing using Octave: Finding the size of a Matrix, Loading Data into Octave, Viewing the Workspace of Octave, Accessing the elements of Matrix, Arithmetic operations on matrices- Addition, Multiplication, log, exponentiation, Transpose, Maximum and Minimum Value of a Matrix

Unit V: Control Statements in Octave, Visualizing Data in Octave-Plotting Data, giving labels, axes and titles, Victimization, Vector implementation, Advantages.

Course Outcome:

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

1. Acquire knowledge of processing using octave

2. Statistically analyse data

3. Compute solutions of linear equations and system of equations

4. Understand the basic concepts of Data Visualization

5. Understand matrices

CO - PO - PSO Mapping

CO	PO					PSO					COGNITIVE LEVEL
	1	2	3	4	5	1	2	3	4	5	
CO 1	S	S	S	M	S	S	S	M	S	M	K – 1
CO 2	S	S	M	S	S	S	S	S	M	S	K – 4
CO 3	M	S	M	S	S	S	S	M	S	S	K – 5
CO 4	S	M	M	S	S	S	M	S	S	S	K – 3
CO 5	S	S	M	S	S	S	S	S	S	S	K – 5

Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L

Books:

1. Jason Lachniet, "Introduction to GNU Octave"
2. Lectures of Professor Dr. Andrew Ng, Stanford University, Coursera.
3. Gene H.Golub, Charles F.Van Loan, "Matrix Computations", John Hopkins University Press.
4. https://skymind.ai/wiki/eigenvector
5. Randolf H. Reiss, B.S, "Eigen Values and Eigen Vectors in Data dimension Reduction for Regression", San Marcos, Texas.
6. Gilbert Strang, "Linear Algebra and its Applications", Thomson Learning Inc., 4th Edition.
7. https://www.cs.utah.edu/~jeffp/M4D/M4D-v0.4.pdf

Core 2   **ARTIFICIAL INTELLIGENCE**

Course Objectives:

L T P C

1. To understand the basic concepts and principles of Artificial Intelligence

4 0 0 4

2. To learn various applications domains of AI
3. To work with Prolog

Unit-I Fundamentals of Artificial Intelligence

Introduction: What is AI? AI Techniques, Representation of Knowledge, Knowledge Based Systems, State Space Search. Production Systems: Problem Characteristics, Types of production systems.

Unit-II Search Strategies

Generate & test, Hill Climbing, Best First Search, A* and AO* Algorithm, Constraint satisfaction, Means-Ends Analysis. Game playing: Minimax Search, Alpha-Beta Cutoffs, Waiting for Quiescence

Unit-III Knowledge Representation

Propositional Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining. First order Logic: Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining.

Architecture of expert systems, Steps to build Expert Systems - Role of expert systems –. Typical expert system – MYCIN

Unit-V Prolog Programming

Introduction to Prolog: Syntax and Numeric Function, Basic List Manipulation Functions in Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays

Course Outcome:

On successful completion of the course, the learners will be able to
1. Delineate Artificial intelligence.
2. Build knowledge based systems.
3. Understand the basics of knowledge representations
4. Develop Expert Systems
5. Reformulate a problem from AI perspective

CO - PO - PSO Mapping

CO	PO					PSO					COGNITIVE LEVEL
	1	2	3	4	5	1	2	3	4	5	
CO 1	S	S	S	M	S	S	S	M	S	S	K – 1
CO 2	S	S	M	S	S	S	S	S	S	S	K – 4
CO 3	S	S	M	S	S	S	M	S	S	S	K – 2
CO 4	S	S	M	S	S	S	S	S	S	S	K – 3
CO 5	S	S	M	S	S	M	S	S	S	M	K – 6

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Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L

Text Books:

1. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence." Tata McGraw Hill, 3rd Edition

2. Stuart Russell & Peter Norvig, "Artificial Intelligence : A Modern Approach", Pearson Education, 2nd Edition.

3. Donald A. Waterman, "A Guide to Expert Systems", Addison Wesley Publishing Company

4. Carl Townsend, "Introduction to Prolog Programming"

5. Ivan Bratko, "PROLOG Programming for Artificial Intelligence", Addison-Wesley, 2nd Edition.

6. Klocksin and Mellish, "Programming with PROLOG"

Reference Books:

1. Eugene, Charniak, Drew McDermott, "Introduction to Artificial Intelligence", Addison Wesley

2. Patterson, "Introduction to AI and Expert Systems", PHI

3. Nilsson, "Principles of Artificial Intelligence", Morgan Kaufmann.

4. Carl Townsend, "Introduction to Turbo Prolog", Paperback

https://nptel.ac.in/courses/106/105/106105077/

https://lecturenotes.in/materials/29314-note-for-artificial-intelligence-ai-by-jaswanth-chowdary

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

L T P C

PROLOG LAB

0 0 4 2

List of programs
1. Write Prolog program to implement A* algorithm.
2. Write Prolog program to implement MinMax search
3. Write Prolog program to solve water jug problem
4. Write Prolog program to implement TicTacToe
5. Write Prolog program to implement alpha-beta pruning
6. Write Prolog program to solve 4 Queen problem

Course Outcome:

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

1. Think logical solution to problems

2. Understand and solve complex problems

3. Select an appropriate algorithm for the problem

4. Evolve as a competent programmer capable of designing algorithms

5. Analyze algorithms

CO - PO - PSO Mapping

PROLOG LAB											
CO	**PO**					**PSO**					**COGNITIVE LEVEL**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	
CO 1	S	S	S	M	S	S	S	M	S	S	K – 1
CO 2	S	S	M	S	S	S	S	S	S	S	K – 4
CO 3	S	S	M	S	S	S	S	S	S	S	K – 5
CO 4	S	S	M	S	S	S	S	S	S	S	K – 3
CO 5	S	S	M	S	S	S	S	S	S	S	K – 5

Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L

Allied Practical 1

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INTERNET OF THINGS LAB

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L T P C

0 1 2 2

List of Programs:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn on LED for 1 sec after every 2 seconds
3. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from ThingSpeak cloud
4.
1. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from ThingSpeak cloud
2. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
5. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth

Course Outcome:

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

1. Gain the basic knowledge about IoT
2. Understand the Protocols of IoT
3. Use IoT related products in real life.
4. Rely less on physical resources
5. Do their work smarter.

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CO - PO - PSO Mapping

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INTERNET OF THINGS											
CO	**PO**					**PSO**					**COGNITIVE LEVEL**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	
CO 1	S	S	S	M	S	S	S	M	S	S	K - 1
CO 2	S	S	M	S	S	S	S	S	S	S	K - 4
CO 3	S	S	M	S	S	S	S	S	S	S	K - 5
CO 4	S	S	M	S	S	S	S	S	S	S	K - 3
CO 5	S	S	M	S	S	S	S	S	S	S	K – 5

Strongly Correlated – S,   Moderately Correlated – M, Weekly Correlated - L