



SRI VENKATESWARA UNIVERSITY
II Year Syllabus for 4-Year UG Honours in BCA. (Artificial Intelligence) as
Major
in consonance with the Curriculum framework w.e.f. AY 2026-27

II Year IV Semester

Sl. No	Category	Course No.	Course Name	No. of Hours		Total No. of Hours	No. of Credits		Total No. of Credits
				Theory	Practical		Theory	Practical	
1	Major-Core	8	Python Programming	3	2	5	3	1	4
2	Major-Core	9	Prolog Programming	3	2	5	3	1	4
3	Major-Core	10	Artificial Intelligence for Games	3	2	5	3	1	4
4	Minor	2		4	0	4	4	0	4
5	MDC	3	-	2	0	2	2	0	2
6	SEC	4	SEC: Design Thinking/Problem solving/ others	2	0	2	2	0	2
				17	6	23	17	3	20

Note:

The number of instructional hours shall be five (5) for courses involving problem-solving, and four (4) for courses comprising only theory.


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II Year Syllabus for 4-Year UG Honours in BCA Artificial Intelligence as Major in consonance with Curriculum framework w.e.f. AY 2026-27

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	IV	8	Python Programming	3	3
			Python Programming Lab	2	1
		9	Prolog Programming	3	3
			Prolog Programming Lab	2	1
		10	Artificial Intelligence for Games	3	3
			Artificial Intelligence for Games - Lab	2	1

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SEMESTER-IV
BCA. (Artificial Intelligence)
COURSE 10: Artificial Intelligence for Games

Theory

Credits: 3

3 hrs/week

Course Objectives:

- To introduce the fundamental concepts and roles of Artificial Intelligence in game design and development.
- To understand movement, steering behaviors, and position/orientation matching techniques in games.
- To develop knowledge of group movement behaviors and advanced steering mechanisms.
- To explore pathfinding algorithms, graph structures, and abstraction techniques used in game environments.
- To design and implement decision-making systems including decision trees and action management in games.

Course Outcomes

At the End of the Course, The Students will be able to:

- Explain the role of AI in game design and analyze movement, pathfinding, and decision-making interfaces.
- Implement kinematic and dynamic steering behaviors for position and orientation matching.
- Design advanced movement behaviors including pursue, evade, and group-based flocking systems.
- Apply pathfinding algorithms using graph-based representations and abstraction techniques.
- Develop decision-making systems using action managers and decision trees for game agents.

UNIT-1

Introduction to Game AI

Course Overview, Roles of AI in Game design, Game AI Interfaces (Movement, Path finding, Decision Making, Strategy), Complexity (Artificial Stupidity, Intelligent Mistakes),

Game AI Inputs, Outputs, and Behaviors: The 2D Rigid body Agent, Steering Output, Variable Matching.

UNIT-2

Position Matching: Kinematic and Dynamic

Orientation Matching: Kinematic and Dynamic: Align, Wander Advanced Movement:

Delegation and Combination : Interfaces, Blending, Arbitration

UNIT-3

Advanced Position and Orientation Matching: Pursue, Evade, Face, Look Where You Are Going

Group Movement: Separation, Flocking

UNIT-4

Structure of Path finding Algorithms: Directed Weighted Graphs, The Family of Search Algorithms

Abstraction Schemes: Lifting and Grounding (Tile Graph, Navmesh), Path Follow Movement

UNIT-5

From Path finding to Movement: The Steering Pipeline, Obstacle and Collision Avoidance

Structure of Decision Making Algorithms: Actions, Action Manager

Decision Trees: Nodes(Decisions, Actions), Design, Performance


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Textbooks:

1. Artificial Intelligence for Games, Ian Millington and John Funge, CRC Press.
2. AI Game Programming Wisdom (Series), Steve Rabin (Editor), Charles River Media.

Reference Books:

1. Programming Game AI by Example, Mat Buckland, Jones & Bartlett Learning.
2. Game AI Pro: Collected Wisdom of Game AI Professionals, Steve Rabin (Editor).
3. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Pearson (for foundational AI concepts).

Activities:**Outcome:**

Students will understand AI roles in game design and analyze agent behaviors and complexity management.

Activity:

Analyze a popular game and identify the AI components used (movement, decision-making, strategy). Students will prepare a short report explaining how artificial stupidity or intelligent mistakes enhance gameplay realism.

Evaluation Method:

Assessment based on clarity of AI identification, understanding of complexity concepts, and quality of analysis.

Outcome:

Students will implement and compare kinematic and dynamic steering behaviors.

Activity:

Students will simulate a moving agent and compare the smoothness and responsiveness of kinematic vs dynamic movement. A short comparison report must be submitted.

Evaluation Method:

Evaluation based on implementation correctness and analytical comparison.

Outcome:

Students will design and evaluate advanced movement behaviors in multi-agent systems.

Activity:

Students will simulate a flocking system and analyze how separation and pursue/evade behaviors affect group movement dynamics.

Evaluation Method:

Assessment based on behavior correctness, simulation performance, and explanation of interaction between behaviors.

Outcome:

Students will analyze pathfinding algorithms and abstraction models.

Activity:

Students will compare two pathfinding techniques (e.g., BFS vs A*) in terms of performance and optimality using a sample grid environment.

Evaluation Method:

Evaluation based on correctness, comparison accuracy, and understanding of graph abstraction.

Outcome:

Students will design decision-making systems for game agents.

Activity:

Students will create a decision tree for an enemy AI character and evaluate its performance in different game scenarios.

Evaluation Method:

Assessment based on logical structure, efficiency, and clarity of decision-making design.

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SEMESTER-IV

COURSE 10: Artificial Intelligence for Games

Practical

Credits: 1

2 hrs/week

List of Lab Experiments:

1. Implement a 2D Rigid Body Agent with basic movement and steering output (velocity, acceleration control).
2. Develop a simple AI-controlled character demonstrating artificial stupidity and intelligent mistakes in gameplay.
3. Implement Position Matching using Kinematic and Dynamic models.
4. Implement Orientation Matching behaviors such as Align and Wander with blending or arbitration techniques.
5. Implement Pursue and Evade behaviors between two agents in a 2D environment.
6. Implement Flocking behavior using Separation and basic Group Movement algorithms.
7. Implement A* pathfinding using a Directed Weighted Graph.
8. Implement a Tile-based Graph or Navmesh abstraction and simulate Path Following movement.
9. Implement Obstacle Avoidance using the Steering Pipeline approach.
10. Design and implement a Decision Tree for a game character (e.g., enemy AI with attack/defend/patrol states).


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BCA Artificial Intelligence Honours
II Year IV Semester
COURSE 10 : Artificial Intelligence for Games

Time : 3 Hrs

Max Marks : 75

SECTION - A

Answer any FIVE of the following

5 X 3= 15 Marks

1. Short answer question from unit-I
2. Short answer question from unit-I
3. Short answer question from unit-II
4. Short answer question from unit-II
5. Short answer question from unit-III
6. Short answer question from unit-III
7. Short answer question from unit-IV
8. Short answer question from unit-IV
9. Short answer question from unit-V
10. Short answer question from unit-V

SECTION-B

Answer FIVE of the following.

5 X 12=60 Marks

11. a) Essay question from Unit-I
OR
b) Essay question from Unit-I
12. a) Essay question from Unit-II
OR
b) Essay question from Unit-II
13. a) Essay question from Unit-III
OR
b) Essay question from Unit-III
14. a) Essay question from Unit-IV
OR
b) Essay question from Unit-IV
15. a) Essay question from Unit-V
OR
b) Essay question from Unit-V


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