



Shirpur Education Society's

R. C. Patel Institute of Technology, Shirpur
(An Autonomous Institute)

Course Structure and Syllabus

Honors Degree Program in Immersive Technologies
Artificial Intelligence and Machine Learning

With effect from Year 2025-26



Shahada Road, Near Nimzari Naka, Shirpur, Maharashtra 425405
Ph: 02563 259 802, Web: www.rcpit.ac.in

Honors Degree Program in Immersive Technologies (w.e.f. 2025-26)

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit	
				L	T	P	Continuous Assessment (CA)				ESE			
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Average of (TT1 & TT2)				
								[A]						
Sem-III														
1	H1	RCP23AH1201	Computer Graphics and Virtual Reality	4			25	15	15	15	60	100	4	4
Sem-IV														
2	H1	RCP23AH1251L	C# Programming Laboratory			4	25				25	50	2	2
Sem-V														
3	H1	RCP23AH1301	Augmented Reality and Mixed Reality	3			25	15	15	15	60	100	3	4
	H1	RCP23AH1301L	Augmented Reality and Mixed Reality Laboratory			2	25				25	50	1	
Sem-VI														
4	H1	RCP23AH1351	Game Design and Gamification	3			25	15	15	15	60	100	3	4
	H1	RCP23AH1351L	Game Design and Gamification Laboratory			2	25				25	50	1	
Sem-VIII														
5	H1	RCP23AH1451	Metaverse	4			25	15	15	15	60	100	4	4
Total				14		8	175			60	315	550		18

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Dean Academics/Dy. Director

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Director



**Honors Degree Program in Immersive
Technologies Artificial Intelligence and
Machine Learning
Semester - IV**



Program: Honors Degree Program in Immersive Technologies Artificial Intelligence and Machine Learning	S. Y. B.Tech	Semester: IV
C# Programming Laboratory (RCP23AH1251L)		

Prerequisite: System Fundamentals.

Course Objectives:

1. Understand the C# fundamentals to build robust VR applications.
2. Discover the proficiency in Unity Engine to create interactive VR experiences.
3. Understand VR concepts and technologies to design immersive virtual environments.
4. Develop practical VR projects to apply learned skills and showcase expertise.

Course Outcomes:

On completion of the course, the learner will be able to:

CO	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the foundation in C# programming for VR development.	L3	Apply
CO2	Discover Unity Engine and its VR tools.	L3	Apply
CO3	Analyze complex problems and break them into manageable tasks for immersive VR.	L2	Understand
CO4	Apply optimization in VR applications for performance and user experience.	L2	Understand



Course Contents

Unit-I

08 Hrs.

Introduction to C# and .NET Framework:

Variables, data types, and operators, Control flow statements (if-else, switch-case, loops), Arrays and collections (lists, dictionaries), Object-Oriented Programming (OOP): Classes, objects, and inheritance, Encapsulation, polymorphism, and abstraction, Interfaces and abstract classes, Methods and Functions: Defining, calling, and overloading methods Parameters and return values, Exception Handling: Try-catch-finally blocks, Custom exceptions.

Unit-II

10 Hrs.

Unity Engine Basics:

Unity Editor: Navigating the Unity interface, Creating and managing projects, Importing assets (models, textures, scripts), Game Objects and Hierarchy: Creating and organizing game objects, Parent-child relationships Components: Transform, Renderer, Collider, Rigid body, and other components Scripting in Unity: Writing C# scripts for Unity, Interacting with Unity objects and components, Using Unity's built-in APIs (e.g., Input, Physics).

Unit-III

10 Hrs.

Unity for Virtual Reality: VR & Types of VR devices (HMDs), Use cases and applications of VR Unity and VR: Setting up a VR project in Unity, Configuring player settings for VR platforms, Using VR input devices (controllers, hand tracking), XR Interaction Toolkit: Understanding the XR Interaction Toolkit. Creating interactive experiences using the toolkit, implementing locomotion, object manipulation, and other interactions.

Unit-IV

10 Hrs.

Advanced VR Techniques, Spatial Mapping, and World Tracking: Understanding spatial mapping and world-tracking concepts Using a Foundation for spatial mapping and object placement, Implementing persistent experiences, and Advanced Rendering Techniques: Shader programming for VR, Post-processing effects (bloom, depth of field, motion blur), Optimizing rendering performance for VR, User Experience Design for VR: Designing intuitive and immersive user interfaces, Considering user comfort and fatigue, Testing and iterating on VR experiences.

Unit-V

VR Project Development, Project Planning, and Design: Defining project scope and goals, Creating a project timeline and milestones. Designing user experiences and interactions, Prototyping and Iteration: Rapid prototyping and testing, Iterative development process, Deployment and Distri-



bution: Packaging and distributing VR applications, Deploying to VR platforms (SteamVR, Oculus Store).

Unit-VI

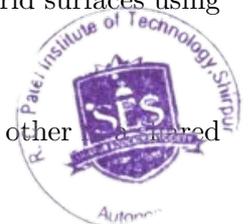
06 Hrs.

VR Networking and Multiplayer Network Programming Basics: Client-server architecture, Networking protocols (TCP/IP, UDP), Unity Networking and Mirror, Multiplayer VR Game Development: Synchronizing player movement and actions, Handling input and output latency, Optimizing network performance.

List of Experiments:

Suggested Experiments:

1. Case Study- on any one topic
 - The rhythm-based game where players swing lightsabers to match the rhythm of the music.
 - Story-driven, single-player adventure game set in the Half-Life universe.
 - Game that allows players to catch Pokémon in the real world.
2. Create a console application that generates a random number and prompts the user to guess it. Provide feedback on each guess
3. Develop a text-based adventure game with multiple choices and outcomes
4. Create a class hierarchy for shapes (e.g., Circle, Rectangle, Triangle) and implement methods to calculate area and perimeter.
5. Write a program to read a text file and count the number of words, lines, and characters.
6. Create a 2D platformer game with a player character, platforms, and enemies. Implement player movement, jumping, and collision detection
7. Develop a 3D first-person shooter with player movement, weapon mechanics, and enemy AI.
8. Create a simple VR scene with a 3D object that the user can interact with using VR controllers.
9. Implement teleportation locomotion in a VR scene, allowing the user to move around by selecting destination points
10. Create an AR application that allows users to place virtual objects on real-world surfaces using spatial mapping.
11. Develop a multiplayer VR game where multiple players can interact with each other in a virtual environment.



12. Mini Project

Minimum 10 experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

Text Books:

1. Dr. Richa Handa C .NET Framework Programming Book For Student: Coding Language, Dr. Richa Handa, Richa Handa Publisher, 2023.
2. C# 10 and .NET 6 - Modern Cross-Platform Development by Mark J. Price, Packt Publication, 2022.
3. Learning C# by Developing Games with Unity - Seventh Edition, Harrison Ferrone, Packt Publication, 2022

Reference Books:

1. Mastering Unity Game Development with C#: Harness the full potential of Unity 2022 game development using C#, Mohamed Essam, Packet Publications, 2024.
2. Beginning Game AI with Unity: Programming Artificial Intelligence with C# Perfect, Sebastiano M. Cossu, Springer Publication, 2022.
3. Game Development Patterns with Unity 2021 - Second Edition, David Baron, Packet Publications, 2021.
4. Unity Virtual Reality Projects: Explore the World of Virtual Reality by Building Immersive and Fun VR Projects Using Unity 3d, Jonathan Linowes, Packt Publications, 2015.

Web Links:

1. <https://www.w3schools.com/cs/index.php>
2. <https://www.codecademy.com/learn/learn-c-sharp>
3. <https://www.udemy.com/course/unityrpg/?couponCode=DIWALIMT102824>
4. <https://www.udemy.com/course/the-ultimate-guide-to-game-development-withunity/?couponCode=DIWALIMT102824>

