



Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)



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Scheme and detailed syllabus of DJS23

Honors Program in Immersive Technologies

Revision: 2024

With effect from the Academic Year: 2024-2025

**Proposed Scheme for Second Year Undergraduate Program in Artificial Intelligence and Machine Learning: Semester IV
(Autonomous) Academic Year (2024-25)**

Sr.	Course Code	Course	Teaching Scheme (hrs.)				Continuous Assessment (A) (marks)			Semester End Assessment (B) (marks)					(A+B)	Total Credits
			Th	P	T	Credits	Th	T/W	Total CA (A)	Th / Cb	O	P	O&P	Total SEA (B)		
Sem III																
1	DJS23ACH1301	Computer Graphics and Virtual Reality	4	--	--	4	40	--	40	60	--	--	--	60	100	4
Sem IV																
2	DJS23ALH1401	C# Programming Laboratory	--	4	--	2	--	25	25	--	--	--	25	25	50	2
Sem V																
3	DJS23ACH1501	Augmented Reality and Mixed Reality	3	--	--	3	40	--	40	60	--	--	--	60	100	3
4	DJS23ALH1501	Augmented Reality and Mixed Reality Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	1
Sem VI																
5	DJS23ACH1601	Game Design and Gamification	3	--	--	3	40	--	40	60	--	--	--	60	100	3
6	DJS23ALH1601	Game Design and Gamification Laboratory	--	2	--	1	--	25	25	--	25	--	--	25	50	1
Sem VIII																
7	DJS23ACH1801	Metaverse	4	--	--	4	40	--	40	60	--	--	--	60	100	4
Total			14	8	0	18	160	75	235	240	50	0	25	315	550	18

Continuous Assessment (A):

Course	Assessment Tools	Marks	Time (mins)
Theory	a. Term Test 1 (based on 40 % syllabus)	--	--
	b. Term Test 2 (on next 40 % syllabus)	--	--
	c. Assignment / course project / group discussion /presentation / quiz/ any other.	--	--
	Total marks (a + b + c)	--	--
Audit course	Performance in the assignments / quiz / power point presentation / poster presentation / group project / any other tool.	--	As applicable
Laboratory	Performance in the laboratory and documentation.	25	
Tutorial	Performance in each tutorial & / assignment.	--	
Laboratory & Tutorial	Performance in the laboratory and tutorial.		

Continuous Assessment (B):

Course	Assessment Tools	Marks	Time (hrs.)
Theory / * Computer based	Written paper based on the entire syllabus.	--	--
	* Computer based assessment in the college premises.		
Oral	Questions based on the entire syllabus.	--	--
Practical	Performance of the practical assigned during the examination and the output / results obtained.	--	--
Oral & Practical	Project based courses - Performance of the practical assigned during the examination and the output / results obtained. Based on the practical performed during the examination and on the entire syllabus.	25	As applicable



Program: Artificial Intelligence & Machine Learning	S.Y. B.Tech	Sem: IV
Course: C# Programming Laboratory (DJS23ALH1401)		

Pre-requisite: Object-oriented programming.

Course Objectives: Students will be able to

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:

1. Understand the foundation in C# programming for VR development.
2. Discover Unity Engine and its VR tools.
3. Analyze complex problems and break them into manageable tasks for immersive VR experiences.
4. Apply optimization in VR applications for performance and user experience.

C# Programming Laboratory (DJS23ALH1401)		
Unit	Description	Duration
1	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.	08
2	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).	10
3	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.	10
4	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,	10

	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	
5	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 Distribution: Packaging and distributing VR applications, Deploying to VR platforms (SteamVR, Oculus Store)	8
6	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.	08
	TOTAL	52

Books Recommended

Textbooks:

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.

Online References:

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-with-unity/?couponCode=DIWALIMT102824>



Suggested List of Experiments:

C# Programming Laboratory (DJS23ALH1401)	
Sr. No	Suggested Experiments
1	Case Study- on any one topic <ol style="list-style-type: none">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 shared virtual environment.
12	Mini Project

Any other experiment based on the syllabus may be included, which would help the learner understand the topic/concept.

Prepared by

Checked by

Head of the Department

Vice Principal

Principal