

Programme Name	LEAVE BLANK
Course Code	LEAVE BLANK
Course Title	Immersive Technology Systems and XR Prototype Engineering

Course Outcomes:

After completion of the Course, the student should be able to -

1. CO1: Understand the foundational principles of 3D graphics, spatial computing, and XR technologies (AR, VR, MR).
2. CO2: Apply spatial mathematics, transformations, and asset creation pipelines to design 3D models using Blender.
3. CO3: Build interactive 3D environments in Unity using lighting, materials, prefabs, C# scripting, and physics engine mechanics.
4. CO4: Develop and present a functional interactive 3D prototype as a base for immersive XR applications.

Course Contents

COURSE CONTENTS		Hrs	CO
1.	Introduction to 3D & XR 3D graphics and 3D environments, applications of 3D, AR, VR, MR and XR, spatial computing, XR hardware and applications, overview of the 3D/XR development pipeline.	3	CO1
2.	3D Spatial Mathematics Coordinate systems, X-Y-Z axes, vectors, position/direction, transformations, translation, rotation, scaling, world & local coordinates, Euler angles, introduction to quaternions	3	CO2
3.	3D Asset Creation with Blender Blender interface, viewport navigation, objects and primitives, Edit Mode, vertices/edges/faces, extrusion, inset, loop cuts, beveling, basic modelling, materials, UV mapping and exporting assets	6	CO2
4.	Unity Engine Fundamentals Complete Unity interface and workflow, Scene/Game/Hierarchy/Inspector/Project windows, GameObjects, Components, Transform, Cameras, Lighting, Materials, Prefabs, importing assets, scene management and basic environment creation	7	CO3
5.	Programming & Interactive Mechanics Introduction to C# for Unity, scripts, variables, functions and conditions, Rigidbody, physics, Colliders, collision detection, triggers, events, player input and basic object interaction	7	CO3
6.	XR & Interactive 3D Prototype Applying the concepts together, XR interaction concepts, basic AR/VR workflow, designing an interactive 3D environment, project development and prototype demonstration	4	CO4

Recommended Reading:

1. *Mathematics for 3D Game Programming and Computer Graphics* — Eric Lengyel “*Learning Virtual Reality*” by Tony Parisi.
2. NOC: Mobile Virtual Reality and Artificial Intelligence, IIT Mandi — *Prof. Varun Dutt*
3. Blender Basics: Classroom Tutorial Book, 5th Edition – James Chronister