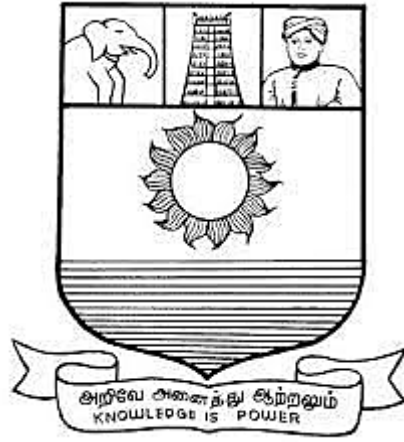




மனோன்மனியம் சுந்தரனார்
பல்கலைக்கழகம்

MANONMANIAM SUNDARANAR UNIVERSITY

**SYLLABUS FOR CERTIFICATE IN AR & VR - UNITY PROGRAM
OFFERED THROUGH DIRECTORATE OF VOCATIONAL EDUCATION
(COMMUNITY COLLEGES AND VOCATIONAL SKILL DEVELOPMENT
CENTRES)
FROM 2023 - 2024**



கல்விசார் நிலை குழு கூட்டம்

**MEETING OF THE STANDING COMMITTEE ON
ACADEMIC AFFAIRS HELD ON TUESDAY
THE 4th JULY 2023.**

CERTIFICATE IN AR & VR - UNITY - 6 MONTHS

SCHEME OF EXAMINATION

Subject Code	Title of the Course	Credit	Hours	Passing Minimum
	Introduction to Blender	4	60	40/100
	Introduction to Unity	4	90	40/100
	Practical I-Augmented Reality	6	120	40/100
	Practical II -Virtual Reality	6	120	40/100
	Project	10	150	40/100

Eligibility for admission: Pass in 10th std examination conducted by the Govt. of Tamilnadu board of secondary education, government of Tamil Nadu or any other equivalent examination.

Examination: Minimum Passing Score for each Course is 40%. Classification will be done based on percentage marks of the total marks obtained in all the courses and as given below:

40 % but less than 50 %	-	Third class
50 % but less than 60 %	-	Second class
60 % and above	-	First class

Course Duration: 6 Months

SYLLABUS

Course I	:	Introduction to Blender
Course II	:	Introduction to Unity
Course III	:	Practical I - Augmented Reality
Course IV	:	Practical II - Virtual Reality
Course V	:	Project

Program Objectives:

- To develop & build Augmented Reality android application.
- To develop & build Virtual Reality Application.

COURSE I
INTRODUCTION TO BLENDER

Objectives:

- The students will know how to use Blender Interface.
- To know how to 3D Model in Blender.
- To know how to texture, Light, animate & Export a 3D asset in blender.

Unit I **10 Hrs**

OVERVIEW

What is Blender- Interfaces- Tools Window - Workspace - Modelling-3D Viewport- Timeline - Status Bar - Properties - Top Bar - Out liner

Unit II **20 Hrs**

BLENDER ESSENTIALS

What is a Mesh - Vertex - Edge - Polygon - Extrude Tool - Object Mode - Edit Mode - Bezier - Curve - Path- Text - Select - Move - Scale - Rotate - Editor - Scene - Object - Transform Orientation - Pivot Point - Bounding Box - 3D Cursor - Active Element - Snap to Increment

Unit III **10 Hrs**

3D MODELLING

Robotic Arm - Smart Factory - Table Armchair - Export Formats - Export to Unity Engine

Unit IV **10 Hrs**

TEXTURING

Introduction to UV Editor - UV Unwrap - Texture Creation - Shaders - Materials

Unit V **10 Hrs**

RENDERING

Camera - Lighting - Animation - Render Image - Render Animation

Web Reference:

1. <https://docs.blender.org/manual/en/latest/interface/index.html>
2. <https://docs.blender.org/manual/en/latest/modeling/meshes/index.html>
3. <https://docs.blender.org/manual/en/latest/modeling/modifiers/index.html>
4. <https://docs.blender.org/manual/en/latest/render/index.html>
5. <https://docs.blender.org/manual/en/latest/animation/introduction.html#animation>

COURSE II

INTRODUCTION TO UNITY

Objectives:

- The students will know how to install Unity & activate Unity.
- To know how to use Unity Editor.
- To know how to use Unity UI Elements to design 2D Scene.
- To know how to handle 3D Assets, Asset Store.
- To know how to use Physics Engine & Animation.
- To know how to use C# to write interaction scripts.

Unit I

5 Hrs

FUNDAMENTALS OF AR & VR

What is Augmented Reality - AR Use Cases - AR Engines - Authoring Tools - AR Market Opportunities - What is Virtual Reality - VR Use Cases - VR Engines - Authoring Tools - VR Market Opportunities

Unit II

10 Hrs

GETTING STARTED WITH UNITY

Overview of Unity - Install Unity Hub - Manage License - Install Unity Editor - Unity Interface - Create new Project - Overview of Unity Editor - Toolbar - Hierarchy window - Game view - Scene view - Overlays - Inspector window - Project window - Status bar - Game Object - Unity Platform Overview - Player Settings - Build Settings - Building your first Android Application

Unit III

20 Hrs

UNITY UI

Canvas - Rect transform - pivot - anchors - sprite import - Text - image - Raw Image - Panel - Button - Input Field - Toggle - Slider - Scrollbar - Scroll View - Dropdown - Event System

Unit IV

25 Hrs

UNITY ENGINE ESSENTIAL

Import 3D Asset - Design 3D Scene - Prefab - Asset Store - Package Manager - Tag - Layer - AV Components - Animation Clip - Animator Controllers - Animation State Machines - Animation Parameters - Rigid Body - Colliders

Unit V

30 Hrs

C# UNITY

Order of execution for event functions - Variables - Functions - Class - Find Game object - Get Component - Transformation - Text - Image - Keyboard Input - Mouse Input - Touch Input - Serialize Field

Web Reference:

1. <https://docs.unity3d.com/Manual/UnityOverview.html>
2. <https://docs.unity3d.com/Manual/UIElements.html>
3. <https://docs.unity3d.com/Manual/AssetWorkflow.html>
4. <https://docs.unity3d.com/Manual/collision-section.html>
5. <https://docs.unity3d.com/Manual/AnimationSection.html>
6. <https://docs.unity3d.com/Manual/class-VideoPlayer.html>
7. <https://docs.unity3d.com/Manual/Audio.html>
8. <https://docs.unity3d.com/Manual/ScriptingSection.html>

COURSE III**PRACTICAL I - AUGMENTED REALITY****TUTORIAL I - DEVELOPING A FURNITURE AR APP USING VUFORIA 60 Hrs****Objectives:**

- To know how to Choose and use AR Target Type in Vuforia Engine.
- To know how to Choose a Marker.
- To know how to develop an AR Android App.

VUFORIA

Overview of Vuforia Engine - Import Vuforia Engine - Create and Configure the Vuforia licence - Create Device Target Manager - Download Image target - Image Target - Device Based - Create Cloud Target Manager - Configure the Cloud DB to Unity - Image Target - Cloud Based - Cylindrical Target - Multi Target - Design Vumark Marker - Vumark - Ground Plane

TUTORIAL II - CAR VISUALIZATION APP USING AR FOUNDATION 60 Hrs**Objectives:**

- The student should know how to import 3D Car Asset.
- To know how to use AR Foundation Feature for Markerless AR Experience.
- To know how to build an AR App using AR Foundation Framework.

AR FOUNDATION

Overview of AR Foundation - Install AR Foundation - Setup AR Foundation Project - Image Tracking - Plane Detection - Face Tracking - Anchors - Environment Probs - Occlusion - XR Simulation

Web Reference:

1. <https://library.vuforia.com/getting-started/getting-started-vuforia-engine-unity>
2. <https://library.vuforia.com/getting-started/vuforia-target-manager>
3. <https://library.vuforia.com/ground-plane/introduction-ground-plane-unity>
4. <https://library.vuforia.com/objects/cloud-recognition>
5. <https://library.vuforia.com/objects/image-targets>
6. <https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@5.0/manual/features/image-tracking.html>
7. <https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@5.0/manual/features/plane-detection.html>
8. <https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@5.0/manual/features/face-tracking.html>
9. <https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@5.0/manual/features/occlusion.html>

COURSE IV**PRACTICAL II-VIRTUAL REALITY****TUTORIAL I - DEVELOP VR APPS FOR GOOGLE CARDBOARD****40 Hrs****Objectives:**

- The student should be able to Build a 360 Virtual Reality Application
- To know how to create a scene transition in 360 VR

360 IMAGE TOUR OF FURNITURE SHOWROOM

Project Setup - Download Cardboard SDK - SDK Setup - Import 2D Assets - UI Design - Sky-box Shader - Interaction Control - Game logic - Scene Transition - Android Build Setting - Building APK-Side Loading to Android Phone.

3D VIRTUAL TOUR OF CAR GARAGE

Project Setup - Download Cardboard SDK - SDK Setup - Import Assets - Organizing 3DAssets - Materials Creation - UI Design - Turntable Animation - Interaction Control - Game Logic - Lighting Setup-Baked Light - Ambient Sound Setup - Android Build Setting - Building APK - Side Loading to Android Phone

TUTORIAL II - DEVELOP VR APPS FOR OCULUS QUEST**80 Hrs****Objectives:**

- To know how to create a walk Inside VR.
- To know how to create a VR App for Oculus Quest Device.

RESIDENTIAL HOME WALK THROUGH

Project Setup - Import Oculus SDK - Import XR Interaction Toolkit SDK - XR Camera Setup - Custom VR Hand - Import .Skl Design - Organizing 3DAssets - UI Implementation- Grabbing Object - Locomotion - Lights - Real-time lighting - Oculus VR build setting - build the APK - Oculus Account - Headset pairing - Developer mode - side loading - Side quest

CNC MACHINE OPERATION OR ASSEMBLY

Project Setup - Import Oculus SDK - Import XR Interaction toolkit - XR Camera Setup - Custom VR Hand - Import 3D Assets - Organizing 3DAssets - Grabbing Object - Push Buttons - Animation Control - GameLogic - Build the APK - Side Loading - Side Quest

CONSTRUCTION PPE SAFETY IDENTIFICATION IN VR

Project Setup - Import Oculus SDK - Import XR Interaction Toolkit - XR Camera Setup - Custom VR Hand - Import 3D Assets - Organizing 3DAssets - UI Implementation - Grabbing Object - PPE Identification Logic - Audio Source - Lights - Oculus VR Build Setting - Build the APK - Side Loading - Side Quest

FACTORY HAZARDS IDENTIFICATION

Project Setup - Import Oculus SDK -Import XR Interaction Toolkit - XR Camera Setup - Custom VR Hand - Import 3D Assets - Organizing 3DAssets - UI Implementation - Identify Obstacles - Hazards Gas - Grabbing Object - Locomotion - Particles - Animation Control - Game logic - Lights - Oculus VR Build Setting - Build the APK - Side Loading - Side Quest

Web Reference:

1. <https://docs.unity3d.com/Packages/com.unity.xr.interaction.toolkit@2.3/manual/index.html>

COURSE V
PROJECT

List Of Exercises:

150 Hrs

- 3D Modelling (chair, Table)
- Calculator App
- Missing Word
- AR Zoo
- AR Business Card
- AR Movie Trailer
- AR Solar System
- AR Map of India
- AR Spell Bee
- VR Human Body
- VR Skeleton System
- VR Solid Shapes Visualization
- VRInterior Design
- VR Car Expo
- VR Real Estate Walkthrough
- 360 Museum VR
- 360 University VR