



மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
Manonmaniam Sundaranar University

SYLLABUS FOR CERTIFICATE IN AR & VR – UNITY PROGRAMME (6 MONTHS)
OFFERED THROUGH DIRECTORATE OF VOCATIONAL EDUCATION
(COMMUNITY COLLEGES AND VOCATIONAL SKILL DEVELOPMENT CENTRES)
FROM 2023 - 2024



Program Code: 5313

CERTIFICATE IN AR & VR – UNITY – 6 MONTHS

SCHEME OF EXAMINATION

Subject Code	Title of the Course	Credit	Hours	Passing Minimum
C23AV11 / E23AV01	Introduction to Blender	4	60	40/100
C23AV12 / E23AV02	Introduction to Unity	4	90	40/100
C23AVP1 / C23AVP1	Practical I - Augmented Reality	6	120	40/100
C23AVP2 / C23AVP2	Practical II - Virtual Reality	6	120	40/100
C23AVPW / E23AVPW	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 View port-Time line - Status Bar – Properties - Top Bar - Outliner

Unit II **20Hrs**

BLENDERESSENTIALS

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 **10Hrs**

3D MODELLING

Robotic Arm – Smart Factory – Table Arm chair – Export Formats – Export to Unity Engine

Unit IV **10Hrs**

TEXTURING

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

Unit V **10Hrs**

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 – RectTransform – pivot – anchors – sprite import – Text – image – Raw Image - Panel-Button-InputField-Toggle-Slider-Scrollbar-ScrollView-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**PRACTICALI – AUGMENTED REALITY****TUTORIAL I –DEVELOPING A FURNITURE AR APP USING VUFORIA 60Hrs****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-ImageTarget-Device Based - Create Cloud Target Manager - Configure the Cloud DB to Unity - Image Target – Cloud Based – Cylindrical Target – Multi Target – DesignVumark Marker-Vumark-Ground Plane

TUTORIALII-CARVISUALIZATIONAPPUSINGARFOUNDATION 60Hrs**Objectives:**

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

ARFOUNDATION

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/facetracking.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 CARD BOARD **40 Hrs**

Objectives:

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

360 IMAGE TOUR OF FURNITURE SHOW ROOM

Project Setup – Download Card board SDK-SDKSetup-Import2DAssets-UI Design-Sky-boxShader-InteractionControl-GameLogic-SceneTransition-Android Build Setting - Building APK-Side Loading to Android Phone.

3D VIRTUAL TOUR OF CARGARAGE

ProjectSetup-DownloadCardboardSDK-SDKSetup-ImportAssets-Organizing 3DAssets-MaterialsCreation-UIDesign-TurntableAnimation-InteractionControl- 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 .Skip Design - Organizing 3DAssets - UI Implementation– Grabbing Object- Locomotion- Lights- Real-time lighting- Oculus VR build setting- build the APK - Oculus Account – Head set 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 - CustomVRHand-Import3DAssets-Organizing3DAssets-UIImplementation-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 3D Assets – 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
- VR Interior Design
- VR Car Expo
- VR Real Estate Walk through
- 360 Museum VR
- 360 University VR