

**MCE Society's**

**Abeda Inamdar Senior College of Arts Science and Commerce**

**Animation Department**



**UG Diploma Course in 3D Animation**



**M. C. E. Society's**

**Abeda Inamdar Senior College**

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

**UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Introduction to 3D Digital Art
<b>Course Code</b>	<b>21AUUD3D101</b>
<b>Semester</b>	1
<b>No. of Credits</b>	4

#### **Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
<b>1.</b>	To introduce the fundamentals of visual design.
<b>2.</b>	To develop the understanding of core concepts of modeling techniques.
<b>3.</b>	Understanding the observation-based approach for creating realism.
<b>4.</b>	Creating photorealistic outputs using various renderers.
<b>5.</b>	Understanding the body dynamics & principles of animation.

#### **Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
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1.	Explore the various techniques & concepts of animation.
2.	Develop & create effective 3D art with visualization & concept.

### Syllabus

Unit No.	Title with Contents	No. of Lectures
<b>Unit I.</b>	<b>Creative Development and The Digital Process</b>	<b>6</b>
	1. Storytelling	1
	2. Character Design	1
	3. Visual and Look Development	1
	4. Production Strategies	1
	5. The Digital Computer Animation	1
	6. The Production Process of Computer Animation	1
<b>Unit II.</b>	<b>Modeling Concept and Technique</b>	<b>15</b>
	1. Space, Objects, and Structures	2
	2. Moving things Around	2
	3. Lines and Curves	3
	4. Geometric Primitives	2
	5. Free-Form Objects	3
	6. Basic Modeling Utilities	3
<b>Unit III.</b>	<b>Shading and Surfacing Characteristics</b>	<b>10</b>
	1. Surface Shading Techniques	2
	2. Surface Color, Texture & Transparency	2
	3. Surface Reflectivity and Refractivity	2
	4. Surface Shader & Multi-Pass	2
	5. Environment Dependent Shading	2
<b>Unit IV.</b>	<b>Camera, Lighting, and Rendering Concepts</b>	<b>15</b>
	1. Types of Cameras	1

	2. Types of Camera Shots and Lens	1
	3. Camera Animation	2
	4. Types of Lighting Sources and Positions	1
	5. Basic Components of a Light Source	2
	6. Lighting Strategies and Mood	1
	7. Ray Tracing	1
	8. Global Illumination and Radiosity	1
	9. Image-Based Lighting	1
	10. Photorealistic and Non-Photorealistic Rendering	2
	11. Hardware Rendering	2
<b>Unit V.</b>	<b>Understanding Rigging &amp; Animation</b>	<b>15</b>
	1. The Basic Rigging & Animation Workflow	1
	2. An Introduction to Skeleton	2
	3. Forward & Inverse Kinematics	2
	4. Forward Kinematics and Model Animation	2
	5. Rigging & Animation Hierarchical Structures	2
	6. Animation Cycles	2
	7. Body Mechanics	2
	8. Two- & Three-Dimensional Integration	2

**References:**

1. Isaac Kerlow the Art of 3D Computer Animation and Effects Wiley Publication.

2. Andy Beane 3D Animation Essentials Sybex Publication.



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**UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Introduction to Maya
<b>Course Code</b>	<b>21AUUD3D102</b>
<b>Semester</b>	1
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
<b>1.</b>	Understanding the interface and mastering the use of menus and shortcuts.
<b>2.</b>	Overview of the components, curves and surfaces of NURBS
<b>3.</b>	Discuss the various methods of creating models in Maya and understanding their geometries.
<b>4.</b>	Creating organic models

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
<b>1.</b>	Understand the role played by Maya in animation and its useful features.
<b>2.</b>	Create polygon models to understand modeling using polygon.

<b>3.</b>	Describe how to Create surfaces with the help of curves.
<b>4.</b>	Describe the usage of multiple NURBS surfaces to create models.
<b>5.</b>	Describe how to Make polygon models to understand poly modeling.

### Syllabus

<b>Unit No.</b>	<b>Title with Contents</b>	<b>No. of Lectures</b>
<b>Unit I.</b>	<b>User Interface</b>	<b>5</b>
	1. Introduction	1
	2. Autodesk Maya Interface	1
	The Title Bar	
	The Main Menu Bar	
	The Status Line	
	The Shelf / Shelves	
	The Toolbox	
	The Channel Box/Layer Editor	
	The Attribute Editor	
	The Tool Setting	
	Time Slider/Range Slider	
	Command Line and Script Editor Button	
	Helpline	
	The Workspace	
	3. All about Menus and Shortcuts	1
	Main Menu and Menu Sets	
	4. Camera and Camera Settings	

	<p>Navigating the Scene.</p> <p>Navigating with Default Cameras and View Cube</p> <p>Adding a Camera.</p> <p>Camera Settings</p> <p>Camera Attributes</p> <p>5. Focus and Shade in View Editor</p> <p>6. Transforming Objects.</p> <p>7. Creating and Placing a Geometry</p> <p>8. Setting up a Project in Maya</p>	2
<b>Unit II.</b>	<b>Basic Nurbs Modeling</b>	<b>11</b>
	<p>1. Introduction</p> <p>2. Understanding NURBS</p> <p>Overview of NURBS Modeling</p> <p>Degree of Curves and Surfaces</p> <p>Parameterization of Curve and Surface</p> <p>Surface Direction</p> <p>Curve Direction</p> <p>Level of Continuity</p> <p>Components of NURBS Curves and Surface</p> <p>Advantages and Disadvantages of NURBS Modeling</p> <p>Creating Curves using Curve Tools.</p> <p>Attaching and Detaching Curves</p> <p>Cutting and Filletting Curves</p> <p>3. NURBS Surfaces</p>	2 2 2 2

	Revolving/ Extruding/ Lofting/Brailing Surfaces Tutorial for Modeling with NURBS	2 1
<b>Unit III.</b>	<b>Advanced Nurbs Modeling</b>	<b>8</b>
	1. Introduction 2. Tutorial for Modeling with Trimmed Surface 3. Tutorial for Modeling NURB Patches 4. Modeling a small asset 5. Modeling a Game asset	2 2 2 1 1
<b>Unit IV.</b>	<b>Polygon Modeling</b>	<b>10</b>
	1. Polygon Anatomy Selecting and Editing Polygon Components Polygon Terminology Polygon Modeling Polygon Normal Two-Manifold vs Non-Manifold Geometry 2. Helpful Interface Elements for Polygon Modeling Heads-up Display Custom Polygon Display 3. Setting up an Image Plane 4. Tutorial for Building a Polygon Model Modeling an LCD Computer Monitor Modeling a Human Ear 5. Advantage and Disadvantages of Polygon Modeling	2      2   2  1  1  1  1
<b>Unit V.</b>	<b>Organic Modeling</b>	<b>15</b>

	1. Introduction	1
	2. Preparing for the Modeling Process Creating a Custom Shelf for a Polygon Model Assigning Hotkeys Using Polygonal Marking Menu	3
	3. Tutorial of Modeling a Humanoid Head or Equivalent Structure Setting up image planes. Planning Topology Model Structure (Blocking the Head) Detailing the Head. Finalizing the Geometry.	5
	4. Hierarchical Subdivision Surfaces	2
	5. Subdividing at Render Time	1
	6. Converting Model to a Subdivision Proxy	1
	7. Sculpt and Finalize with the Geometry Tool	2
<b>Unit VI.</b>	<b>Preparing Models for Animation</b>	<b>8</b>
	1. Introduction	2
	2. Converting Geometry.	2
	3. Generating Poly Surfaces from NURBS Curves	1
	4. Converting NURBS Surfaces to Poly Surfaces	1
	5. Hierarchical Subdivision Surfaces	1
	6. Tutorial for Modeling a Hand with Subdivision Surfaces	1

**References:**

Nitiraj Singh Mandloi Introduction to Maya



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**UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Introduction to Texturing & Lighting
<b>Course Code</b>	21AUUD3D103
<b>Semester</b>	1
<b>No. of Credits</b>	4

#### **Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
1.	Understand different types of texture maps.
2.	Understand the fundamental physics of lighting and how lights in Maya work.
3.	Discuss about different renderers that are existing in Maya.
4.	Study the procedure of rendering in Maya specially for post-production.
5.	Understand the use of adobe photoshop for the compositing process.

#### **Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
1.	Explain the basics of texturing.
2.	Describe the working of the UV texture Editor.

<b>3.</b>	Elaborate about the types of lights and their settings available in Maya.
<b>4.</b>	Discuss how to render a scene in different renderers.
<b>5.</b>	Describe how to make various render passes.
<b>6.</b>	Explain the process of compositing the render passes.

### Syllabus

<b>Unit No.</b>	<b>Title with Contents</b>	<b>No. of Lectures</b>
<b>Unit I.</b>	<b>Texture Basics in Maya</b>	<b>10</b>
	1. Introduction	2
	2. Texturing Basics in Maya Hypershade	2
	3. Editing Materials Using Hypershade and Attribute Editor i. Working with Hypershade ii. Editing Material Using Attribute Editor	2
	4. Rendering Nodes and their Attributes i. Material Nodes and their attributes ii. Texture Nodes iii. Placement Nodes.	4
<b>Unit II.</b>	<b>Texturing In Practicing</b>	<b>15</b>
	1. Introduction	2
	2. Tutorial on building shading Networks i. Texturing stone wall Material ii. Creating Bronze Material iii. Creating Bump & Reflectivity maps	5
	3. UV Texture mapping i. Creating Uv's	2
	4. UV Texture Editor i. Editing UVs	4

	Automatic Mapping, Exporting UVs & Importing Custom Texture 5. Mapping Human Model	2
<b>Unit III.</b>	<b>Lights and Camera</b>	<b>15</b>
	1. Introduction	2
	2. Light Nodes	5
	i. Types of lights	
	ii. Light Effects	
	iii. Types of shadows	4
	3. Camera Nodes	
	i. Camera Settings	
	ii. Camera Tools	2
	iii. Camera Attributes	
	4. Outdoor Environment Lighting	
	5. Creating Dome Light	2
<b>Unit IV.</b>	<b>Rendering</b>	<b>10</b>
	1. Introduction	2
	2. Rendering in Maya	4
	i. Types of Rendering in Maya	
	ii. Available Renders in Maya	
	iii. Interactive Photorealistic Rendering (IPR)	
	iv. Render Output/File formats	
	v. Image Quality and Render speed	
	vi. Object specific Render Attributes/Render stats	4
	3. Understanding Mental Ray	
	i. Global Illumination	
	ii. Final Gather	
	iii. Image Based Lighting	
	iv. Rendering an Interior with GI	
	v. Caustics	
	vi. Displacement Mapping	

	vii. High Dynamic Range Image (HDRI)	
<b>Unit V.</b>	<b>Rendering For Post - Production</b>	<b>5</b>
	<ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Camera Mapping</li> <li>3. Creating A Reflection Map <ul style="list-style-type: none"> <li>i. Environment Ball</li> </ul> </li> <li>4. Rendering a sequence. <ul style="list-style-type: none"> <li>i. Render Layers</li> <li>ii. Render setting Override</li> </ul> </li> <li>5. Rendering in a separate pass for post-Production multi-render pass workflow Batch Render</li> </ul>	<ul style="list-style-type: none"> <li>1</li> <li>1</li> <li>1</li> <li>1</li> <li>1</li> </ul>
<b>Unit VI.</b>	<b>Compositing for Postproduction</b>	<b>5</b>
	<ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Setting up the compositing software. <ul style="list-style-type: none"> <li>i. compositing various passes</li> </ul> </li> <li>3. Rendering passes and compositing rendering layer</li> </ul>	<ul style="list-style-type: none"> <li>1</li> <li>2</li> <li>2</li> </ul>

**References:**

1. Rohan Pag Advanced Maya



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**UG Diploma Course in 3D Animation  
2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Poly Modeling and Aesthetics Development
<b>Course Code</b>	<b>21AUUD3D104</b>
<b>Semester</b>	1
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
<b>1.</b>	With the help of various tools & techniques of the 3D software application, one can create impressive models starting from basic to advanced, the tools allow the user to effectively manipulate the objects to get desired results.
<b>2.</b>	3D art looks extraordinary when it has powerful aesthetics, using various surfacing techniques one can achieve the appealing quality in the design.

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
<b>1.</b>	To effectively use various modeling tools.
<b>2.</b>	Using references to create models.
<b>3.</b>	Creating organic models with proper topology.

<b>4.</b>	Learn the importance of UV mapping.
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**Guidelines:**

Sr. No.	Objectives
<b>1.</b>	<p><b>Lab Book:</b></p> <p>The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.</p>
<b>2.</b>	<p><b>Submission:</b></p> <p>The assignments are to be submitted by the student in the form of a Project folder, MA,. mb or OBJ Format and a final render in .JPG format. Each assignment includes the Assignment Title, Date of submission, Name of Students.</p>
<b>3.</b>	<p><b>Poly Modeling:</b></p> <p>Assignments should be done individually by the student. The submission should include Clay &amp; Wireframe render in JPG or PNG format.</p>
<b>4.</b>	<p><b>Aesthetics Development:</b></p> <p>Assignments should be done individually by the student. Students have to texture &amp; light the model. The submission should include the final render in JPG or PNG format.</p>
<b>5.</b>	<p><b>Assessment:</b></p> <p>Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of students. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, and creativity.</p>
<b>6.</b>	<p><b>Operating Environment:</b></p> <p>For Poly Modeling and Aesthetics development</p> <p>Operating system: Windows 10</p> <p>Software: Autodesk Maya</p>

## Syllabus

Unit No	Title with Contents	No. of Lectures
	<b>Suggested List of Assignments:</b>	<b>90</b>
	1. Create a Scene with the help of Primitives and Splines. 2. Create objects using Revolve. 3. Create Basic Assets (Table) 4. Set Dressing (Small Environment) 5. Basic Character Modeling	18 18 18 18 18

### References:

Books: Laboratory handbook



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**UG Diploma Course in 3D Animation  
2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Texturing & Lighting
<b>Course Code</b>	21AUUD3D105
<b>Semester</b>	1
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
1.	With the help of various tools & techniques of the 3D software application, one can create impressive models starting from basic to advanced, the tools allow the user to effectively manipulate the objects to get desired results.
2.	3D art looks extraordinary when it has powerful aesthetics, using various surfacing techniques one can achieve the appealing quality in the design.

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
1.	To effectively use various modeling tools.
2.	Using references to create models.

3.	Creating organic models with proper topology.
4.	Learn the importance of UV mapping.

**Guidelines:**

Sr. No.	Objectives
	<p><b>Lab Book:</b> The lab book is to be used as a hands-on resource, reference, and record of assignment submission and completion by the student. The lab book contains the set of assignments that the student must complete as a part of this course.</p>
	<p><b>Submission:</b> The assignments are to be submitted by the student in the form of a Project folder, .ma, .mb, or FBX Format, Compositing file, and videos. Each assignment includes the Assignment Title, Date of submission, Name of Students.</p>
	<p><b>Texturing &amp; Lighting</b> Assignments should be done individually by the student. The submission should include either the play blast or a compiled sequence render of simulation with lighting.</p>
	<p><b>Assessment:</b> Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of students. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, and creativity.</p>
	<p><b>Operating Environment:</b> For Texturing/Lighting Operating system: Windows 10 Software: Autodesk Maya</p>

## Syllabus

Unit No.	Title with Contents	No. of Lectures
	<b>Suggested List of Assignments:</b>	<b>90</b>
	1. Texture the Tea Table Scene (Basic Texturing)	13
	2. Reflective & Refractive Objects (Basic Shading)	12
	3. Basic MatchBox Unwrapping & Texturing	13
	4. Background Unwrapping & Texturing	12
	5. Character Face Texturing	13
	6. Three Point Lighting	12
	7. Interior Daylight Setup	13

### References:

Books: Laboratory handbook



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**UG Diploma Course in 3D Animation  
2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Introduction to Rigging Fundamentals
<b>Course Code</b>	<b>21AUUD3D201</b>
<b>Semester</b>	2
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
1.	Learning the use of deformers for manipulations of geometry with the help of deformers. 2. Understand the concept of skeleton using Maya
2.	Learn about connection attributes.
3.	Understand the concept of skinning.

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
1.	Understand how deformers function in Maya.
2.	Understand skeleton hierarchy.
3.	Create a biped skeleton for understanding of the process of creating human rigs.

<b>4.</b>	Understand the process of building a control rig
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### Syllabus

Unit No.	Title with Contents	No. of Lectures
<b>Unit I.</b>	<b>Deformers</b>	<b>6</b>
	1. Introduction	1
	2. Non-linear Deformers Applying and Using Nonlinear Deformers Bend Flare Sine Squash Twist Wave Nodes, History, and the Deformation Order	2
	3. Specialized Deformers Lattice Deformers Cluster Deformer Wire Deformer Soft Modification Tool Blend Shape Deformer Wrap Deformer	3
<b>Unit II.</b>	<b>Joints And Skeletons</b>	<b>11</b>
	1. Introduction	2
	2. Creating Skeletons Skeleton Components Skeleton Hierarchy	3

	<p>Building Skeletons</p> <p>3. Joints</p> <p>Joint Tool Options</p> <p>Setting up Joints for Posing and Animation</p> <p>Selecting, Creating, Mirroring and Connecting Joints</p> <p>World Objects and Local Transformation</p> <p>4. Tutorial for Creating Biped Skeleton</p> <p>Selecting and Inserting joints</p> <p>Orienting Joint</p>	<p>4</p> <p>2</p>
<b>Unit III.</b>	<b>Basics Of Skinning</b>	<b>8</b>
	<p>1. Introduction</p> <p>2. Introduction to Skinning</p> <p>Methods of Skinning</p> <p>Changing a skinned Object's deformation order</p> <p>Point tweaking skinned objects</p> <p>Editing node behavior to improve performance</p> <p>Workflow summary.</p> <p>3. Tutorial on Smooth Skinning a Character</p> <p>Understanding Smooth Skinning</p> <p>Binding Smooth Skin</p> <p>Editing smooth skin</p> <p>Using Smooth Skin Influence Objects</p> <p>Instances</p>	<p>1</p> <p>3</p> <p>4</p>
<b>Unit IV.</b>	<b>Connection Tools</b>	<b>15</b>
	<p>1. Introduction</p> <p>2. Dependency Graph</p> <p>Nodes</p> <p>Attributes</p> <p>Connections</p> <p>Types of Connections</p> <p>Keyed Relationships</p>	<p>2</p> <p>7</p>

	<ul style="list-style-type: none"> <li>3. Understanding Constraints</li> <li>    Constraint Node Behavior</li> <li>    Enabling and Disabling Constraint Nodes</li> <li>    Workflow Summary</li> <li>    Using Point Constraints</li> <li>    Using Geometry Constraints</li> </ul>	6
<b>Unit V.</b>	<b>Character Controls</b>	<b>20</b>
	<ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Building Skeletons <ul style="list-style-type: none"> <li>Understanding Skeleton Construction</li> <li>Creating Joint Chains and Limbs</li> <li>Editing Joints</li> </ul> </li> <li>3. Posing Skeletons <ul style="list-style-type: none"> <li>Forward Kinematics</li> <li>Inverse Kinematics</li> <li>Handles and Chains of Inverse Kinematics</li> </ul> </li> <li>4. Building a Control Rig <ul style="list-style-type: none"> <li>Control Objects</li> <li>Rig Controls</li> <li>IK or FK</li> <li>Setup Theory</li> <li>The Hips</li> <li>The Legs and Feet</li> <li>Automatic Foot Roll</li> <li>Arms and Wrist</li> <li>Shoulder Blades</li> <li>Chain Up Vectors: The Third Dimension</li> <li>Controlling the Head Using a Position and Orientation Constraint</li> <li>Invert the Constraints.</li> <li>Fine-Tuning and Parenting the Rig</li> <li>Creating a Model Space</li> </ul> </li> </ul>	2  3   4     11

**References:**

1. Rohan Page Advanced Maya
2. Rohan Page Character Setup and Animation in Maya



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**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	<b>Introduction To Animation Fundamentals</b>
<b>Course Code</b>	<b>21AUUD3D202</b>
<b>Semester</b>	2
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
1.	Understanding the history & evolution of Animation
2.	Recognize the significance of storytelling.
3.	Learn the importance of storyboarding & editorial.
4.	Observe & recognize different walk & run styles.
5.	Understanding the techniques of computer animation.

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
1.	Analyze different types of animation.
2.	Develop impressive 3D animation with application of animation

	principles
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### Syllabus

Unit No.	Title with Contents	No. of Lectures
<b>Unit I.</b>	<b>Animation Overview</b>	<b>5</b>
	1. Defining Animation	1
	2. Exploring the Animation Industry	1
	3. The History of 2D and 3D Animation	1
	4. The Dawn of Computer Animation	1
	5. The Foundation of Modern Computing	1
<b>Unit II.</b>	<b>Exploring Animation, Story and Pre-visualization</b>	<b>10</b>
	1. Building a Good Story	2
	2. Using Principles & Traditional Animation	3
	3. Using a Script to Animate an object	2
	4. Character Animation	1
	5. Character, Goal & Conflict	1
	6. Pre-visualization Techniques in Animation	1
<b>Unit III.</b>	<b>Principles of Animation</b>	<b>12</b>
	1. The Craft of Animation	2
	2. The Twelve Principles	2
	3. Few More Principles	3
	4. Character Development	2
	5. Storyboarding & Editorial	3
<b>Unit IV.</b>	<b>Human Walks and Run Animation</b>	<b>15</b>
	1. Walk Cycles	3
	2. Walk Cycles displaying Different Moods.	2

	3. Pose to Pose.	4
	4. Two People Walk Cycle Together	1
	5. Run Cycles	3
	6. Changing the pace and mood in Run Cycles	2
<b>Unit V.</b>	<b>Computer Animation Techniques</b>	<b>18</b>
	1. Keyframe Interpolation and Parameter Curves	2
	2. Creating a Full Skeleton	1
	3. Binding the Skin to the Skeleton	2
	4. Blend Shapes & Expressions	3
	5. Hierarchical Character Animation	1
	6. Lighting and Camera Animation	1
	7. Procedural Animation	2
	8. Facial Animation	2
	9. Crowd Animation	1
	10. Interactive Animation	1
	11. Animation with A Motion Path	2

**References:**

1. Roger King 3D Animation for the Raw Beginner CRC Press Publication
2. Steve Roberts Character Animation in 3D Focal Press Publication



**M. C. E. Society's**

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**UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Introduction to Dynamics
<b>Course Code</b>	<b>21AUUD3D203</b>
<b>Semester</b>	2
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
1.	Learn to create cloth in Maya.
2.	Learn out about the particle system in Maya and its various attributes.
3.	Using a dynamic hair system to model realistic hairstyles and hair behavior.
4.	Learning Maya Fluids to simulate gaseous effects such as clouds, smoke, flames, explosions, and so on.

<b>Sr. No.</b>	<b>Learning Outcome</b>
1.	Explain the system of particles and fields.
2.	Explain the method of creating Hair in Maya.
3.	Describe How to make different types of cloth objects.

<b>4.</b>	Use fluid containers
<b>5.</b>	Render fluid containers

### Syllabus

<b>Unit No.</b>	<b>Title with Contents</b>	<b>No. of Lectures</b>
<b>Unit I.</b>	<b>Particles and Fields</b>	<b>10</b>
	1. Introduction	1
	2. Introduction to Particles Particle Tool Emitter	2
	3. Particle Attributes Lifespan Render Attributes Per Particle Attributes	4
	4. Fields Applying Fields. Types of Fields Common Field Attributes	3
<b>Unit II.</b>	<b>Maya Hair</b>	<b>12</b>
	1. Introduction	2
	2. Using Hair in Maya Creating Hairs. Hair Presets	4
	3. Maya Hair Understanding XGen Creating XGen Description Dynamic Curve with IK Spline	6
<b>Unit III.</b>	<b>Maya Cloth</b>	<b>8</b>
	1. Introduction	2

	<ul style="list-style-type: none"> <li>2. Loading Cloth with Maya</li> <li>3. Creating A Tablecloth using Maya classic cloth Creating a dress</li> </ul>	<ul style="list-style-type: none"> <li>2</li> <li>4</li> </ul>
<b>Unit IV.</b>	<b>Maya Fluids</b>	<b>15</b>
	<ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Using Fluid Containers Using 2D Containers. Using Fields with Fluids Using 3D Containers.</li> <li>3. Fluid Interactions Emitting Fluids from a Surface Making Flames. Igniting the Fuel</li> <li>4. Rendering Fluid Containers Create Fluids and nParticle Interactions. Emitting Fluids from nParticles</li> </ul>	<ul style="list-style-type: none"> <li>2</li> <li>5</li> <li>4</li> <li>1</li> <li>3</li> </ul>
<b>Unit V.</b>	<b>Dynamic Effects</b>	<b>15</b>
	<ul style="list-style-type: none"> <li>1. Introduction</li> <li>2. Creating nCloth Objects Making a Polygon Mesh Dynamic Applying nCloth Presets.</li> <li>3. Creating nCloth and nParticle Interactions Creating an nParticle Goal Controlling Collision Events</li> <li>4. Rigid Body Dynamics Creating an Exploding Tower Tuning the Rigid Body Simulation Baking the Simulation</li> </ul>	<ul style="list-style-type: none"> <li>2</li> <li>3</li> <li>5</li> <li>5</li> </ul>

**References:**

1. Rohan Page Advanced Maya
2. Todd Palamar Mastering Autodesk Maya Sybex Publication



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**UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	Basics of Rigging & Animation
<b>Course Code</b>	<b>21AUUD3D204</b>
<b>Semester</b>	2
<b>No. of Credits</b>	4

**Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
<b>1.</b>	For creating an impressive animation, one should first need to create an efficient Rig setup, which can be done using the various tools available inside the 3D application.
<b>2.</b>	Understanding the various techniques for animation provides the opportunity to develop powerful animation

**Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
<b>1.</b>	On completion of this course, students will be able to : Recognize various tools of rigging.

2.	Creating mechanical & organic rigging.
3.	Recognizing the importance of poses
4.	Creating different animations.

**Guidelines:**

Sr. No.	Objectives
	<p><b>Lab Book:</b></p> <p>The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.</p>
	<p><b>Submission:</b></p> <p>The assignments are to be submitted by the student in the form of a Project folder, .ma, .mb or FBX Format and videos. Each assignment includes the Assignment Title, Date of submission, Name of Students.</p>
	<p><b>Rigging:</b></p> <p>Assignments should be done individually by the student. The submission should include the screen recording of the setup and video format should be either MP4 or AVI.</p>
	<p><b>Animation:</b></p> <p>Assignments should be done individually by the student. The submission should include either the play blast or a compiled sequence render of animation.</p>
	<p><b>Assessment:</b></p> <p>Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of students. Each lab assignment assessment will be assigned grade/marks based on parameters</p>

	with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, and creativity.
	<b>Operating Environment:</b> Basics of Rigging & Animation Operating system: Windows 10 Software: Autodesk Maya

### Syllabus

Unit No	Title with Contents	No. of Lectures
	<b>Suggested List of Assignments:</b>	<b>90</b>
	1. Basic Rigging (Pendulum)	10
	2. Mechanical Rigging (Toy Train)	10
	3. Bone Leg Setup (Separately)	10
	4. Bone Hand Setup (Separately)	10
	5. Basic of Skinning	10
	6. Bouncing Ball Animation	10
	7. Pose to Pose Animation	10
	8. Creating Strong Poses	10
	9. Character Animation (Walk Cycle)	10

### Reference:

Books: Laboratory handbook



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### **UG Diploma Course in 3D Animation**

**2021-22 (CBCS – Autonomy 21 Pattern)**

<b>Course/ Paper Title</b>	<b>FX &amp; Physics Simulation</b>
<b>Course Code</b>	<b>21AUUD3D205</b>
<b>Semester</b>	2
<b>No. of Credits</b>	4

#### **Aims & Objectives of the Course**

<b>Sr. No.</b>	<b>Objectives</b>
<b>1.</b>	Dynamics are a complex physics engine inside your 3D application; dynamics describes how objects move using rules of physics to simulate real-world forces.
<b>2.</b>	3D application provides powerful tools to achieve these complex simulations.

#### **Expected Course Specific Learning Outcomes**

<b>Sr. No.</b>	<b>Learning Outcome</b>
<b>1.</b>	On completion of this course, students will be able to: Creating real-world simulations effects.

2.	Creating realistic looking fluids & rigid body simulations
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**Guidelines:**

Sr. No.	Objectives
	<p><b>Lab Book:</b></p> <p>The lab book is to be used as a hands-on resource, reference and record of assignment submission and completion by the student. The lab book contains the set of assignments which the student must complete as a part of this course.</p>
	<p><b>Submission:</b></p> <p>The assignments are to be submitted by the student in the form of a Project folder, .ma, .mb or FBX Format and videos. Each assignment includes the Assignment Title, Date of submission, Name of Students.</p>
	<p><b>FX:</b></p> <p>Assignments should be done individually by the student. The submission should include either the play blast or a compiled sequence render of simulation with lighting.</p>
	<p><b>Assessment:</b></p> <p>Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of students. Each lab assignment assessment will be assigned grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, and creativity.</p>
	<p><b>Operating Environment:</b></p> <p>For FX &amp; Physics Simulation            Operating system: Windows 10            Software: Autodesk Maya</p>

## Syllabus

<b>Unit No</b>	<b>Title with Contents</b>	<b>No. of Lectures</b>
	<b>Suggested List of Assignments:</b>	<b>90</b>
	1. nParticles Simulation (Smoke) 2. Fluids Simulation (Fire) 3. Create nHair on Character Face. 4. Active and Passive Rigid Body (Break a Wall)	23 22 23 22

### Reference:

Books: Laboratory handbook