ABEDA INAMDAR COLLEGE PUNE

PG Diploma In 3D Animation

(Faculty of Science & Technology)

3D Animation

Choice Based Credit System Syllabus

To be implemented from Academic Year 2021-2022

Title of the Course: Post Graduate Diploma Course In 3D Animation

Preamble:

In today's era where 3d is indulged in every field of entertainment as well all various different fields of career, getting a well-trained 3d artist becomes a challenge. That is why the Faculty of Science & Technology has felt the requirement to start with a PG Diploma course in 3d animation. This course is a one-year specialization program and has been prepared while keeping both students and working professionals in mind.

Introduction:

Animation is a type of optical illusion that has computer-generated artificial characters, effects, and environment. With the help of software like 3ds Max, Maya, Zbrush, Blunder and so many game products and 3d animation movies are produced in today's market. The objective of this course is to provide specialized knowledge of the elected module of 3d animation, that covers all aspects of the module. It will help to develop an aesthetic sense in the students and to make students capable of working in a studio environment as well as to develop his/her own studio setup.

Prerequisite:

- Students must have basic operational knowledge of computers.
- Students must understand the English language.
- Students must have basic knowledge of the Internet.

Duration: The Program comprises two semesters.

Evaluation: Two semesters program with the combination of 60% Semester End Examination and 40% Continuous Evaluation per semester.

Number of seats: 60

Eligibility: Graduation Any Stream

Semester - 1

Titles of Papers, Credit Allocation, and Scheme of Evaluation

(Total credits=30)

Paper Code	Course Type	Paper title	Credits		Evaluation		
			T	P	CE	SEE	Total
21AUPGD3D101	Core Credit Theory	Advance Polly engineering and Sculpting	4	-	40	60	100
21AUPGD3D102	Core Credit Theory	Polly Painting Techniques	4	-	40	60	100
21AUPGD3D103	Core Credit Theory	Digital Lighting and Rendering	4	-	40	60	100
21AUPGD3D104	Core Credit Practical	Modeling and Sculpting	-	4	40	60	100
21AUPGD3D105	Core Credit Practical	Advanced shading and Texturing	-	4	40	60	100
21AUPGD3D106	Core Credit Practical	Advanced Lighting	-	4	40	60	100
21AUPGD3D107	Core Credit Practical	Rendering and Compositing	-	4	40	60	100
21AUPGD3D108	Core Credit Practical	Project/Portfolio		2	20	30	50
Total			**12**	**18**	**300**	**450**	**750**

Abbreviation:

T: Theory

P: Practical

CE: Continuous evaluation

SEE: Semester End Examination

Semester - 2

Titles of Papers, Credit Allocation, and Scheme of Evaluation

(Total credits=30)

Paper Code	Course Type	Paper title	Credits		Evaluation		
			T	P	CE	SEE	Total
21AUPGD3D201	Core Credit Theory	Advance Rigging	4	-	40	60	100
21AUPGD3D202	Core Credit Theory	Digital Animation	4	-	40	60	100
21AUPGD3D203	Core Credit Theory	Compositing for 3d	4	-	40	60	100
21AUPGD3D204	Core Credit Practical	Character setup	-	4	40	60	100
21AUPGD3D205	Core Credit Practical	Project/Portfolio	-	8	80	120	200
21AUPGD3D206	Core Credit Practical	On job training	-	6	60	90	150
Total			**12**	**18**	**300**	**450**	**750**

Abbreviation:

T: Theory

P: Practical

CE: Continuous evaluation

SEE: Semester End Examination

Semester 1

Semester - I

Paper - I

Course Type: Core Course Theory **Course Code:21AUPGD3D101**

Course Title: Advance Polly engineering and Sculpting

Teaching Scheme	No. of Credits	Examination Scheme
5 Hours / Week	4	CE: 40Marks SEE: 60Marks

Course Objectives:

1 . To introduce the fundamentals of visual design.

2. To develop the understanding of core concepts of modeling techniques.

3. Understanding the observation-based approach for creating realism.

4. Creating photorealistic outputs using various renderers.

5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1. Explore the various techniques & concepts of animation.
2. Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**INSTALLATION UPGRADING & ACTIVATION**	**3 Hour**

1.1 System Requirements
1.2 Installation and Activation
1.3 Upgrading
1.4 Auto Update
  1.4.1 Auto Update In Action
1.5 Un-installation
1.6 Support Registration
1.7 Backward Compatibility of ZBrush Files

Chapter 2	**THUMBNAIL**	**3 Hour**

2.1 How Thumbnail Works
2.2 Thumbnail Functions
2.2.1 Thumbnail
2.2.2 Silhouette Mode
2.2.3 Size Slider
2.2.4 Magnify Slider
2.2.5 Export Thumbnail
2.2.6 Import
2.2.7Background
2.3 Thumbnail Hotkeys
2.3.1 Thumbnail Magnify
2.3.2 Import Thumbnail Background Image
2.3.3 Move/Pan Thumbnail Background Image
2.3.4 Scale Thumbnail Background Image
2.3.5Assign Document Snapshot to Thumbnail Background

Chapter 3	**CAMVIEW**	**3 Hour**

3.1 How CamView Works
3.2 CamView Functions
3.2.1 CamView On
3.2.2 Next
3.2.3 Size
3.2.4 Make CamView
3.3 Selecting & Storing CamView Defaults
3.4 Creating a Custom CamView

Chapter 4	**DRAW DRAFT ANALYSIS**	**4 Hour**

4.1 How Draw Draft Analysis Works
4.2 Draw Draft Analysis Functions
4.2.1 Draft Angle
4.2.2 SetDir
4.2.3 InvDir
4.3 Draw Draft Analysis in Action

Chapter 5	**POLYPAINT FROM THICKNESS**	**2 Hour**

5.1 How PolyPaint From Thickness Works
5.2 From Thickness Functions
5.2.1 Quality Slider
5.2.2 Max Range Slider
5.2.3 Min Range Slider
5.2.4Preferences >> Analysis (PolyPaint Color Spectrum)
5.3 How Color Analysis S - C5 Slots are Calculated
5.4 Polypaint From Thickness in Action

Chapter 6	**POLYPAINT FROM DRAFT**	**2 Hour**

6.1 How PolyPaint From Draft Works
6.2 PolyPaint From Draft Functions
6.2.1 Draft Angle
6.2.2 SetDirInvDir

Chapter 7	**MASK BY DRAFT**	**4 Hour**

7.1 How Draw Draft Masking Works
7.2 Mask By Draft Functions
7.2.1Draft Angle
7.2.2SetDir
7.2.3InvDir

Chapter 8	**ADJUST COLORS**	**3 Hour**

8.1 How Adjust Colors With PolyPaint Works
8.2 How Adjust Colors With UV Texture Works
8.3 Adjust Colors in Action
8.4 Adjust Colors Functions
8.4.1 Hide Colors
8.4.2 Hide Materials
8.4.3 Tolerance Slider
8.4.4 Hide Mask
8.4.5 Inverse Mask
8.4.6 Blur Mask
8.4.7 Overwrite
8.4.8 Mask
8.4.9 Unmask

Chapter 9	**MASK BY POLYPAINT**	**3 Hour**

9.1 How Mask By PolyPaint Works
9.2 Mask By PolyPaint Functions
- 9.2.1 Hide Colors
- 9.2.2 Hide Materials
- 9.2.3 Hide Mask
- 9.2.4 Inverse Mask
- 9.2.5 Blur Mask
- 9.2.6 Overwrite
- 9.2.7 Mask
- 9.2.8 Unmask

Chapter 10	**SCULPT & PAINT MORPH UV**	**3 Hour**

10.1 How Sculpting & Painting to Morph UV Works
10.2 Morph UV Functions
- 10.2.1 Morph UV
- 10.2.2 Bump Slider

Chapter 11	**DECO CURVE BRUSHES**	**2 Hour**

11.1 DecoCurve Brushes & How They Work
- 11.1.1 DecoCurve Dots
- 11.1.2DecoCurveDragDots

Chapter 12	**FROM BRUSH**	**4 Hour**

12.1 How From Brush Works
12.2 Strokes functions with From Brush
- 12.2.1 Freehand Stroke
- 12.2.2 DragRect Stroke
- 12.2.3 Dots Stroke
- 12.2.4 DragDot Stroke
- 12.2.5 DragDot Stroke
- 12.2.6Spray Strokes

Chapter 13	**HATCH BRUSHES**	**2 Hour**

13.1 Hatch Brushes & How They Work 13.1.1 Hatch Brush 13.1.2 HatchBackTrack Brush		
Chapter 14	**HISTORY RECALL BRUSH**	**2 Hour**
14.1 How HistoryRecall Works 14.2 History Recall Brush in Action		
Chapter 15	**MOVE INFINITE DEPTH BRUSH**	**4 Hour**
15.1 MoveInfiniteDepth Brush in Action 15.2 MoveInfiniteDepth Brush with Surface Curvature		
Chapter 16	**NO BACK & FORTH MODE**	**4 Hour**
16.1 How No Back & Forth Mode Works 16.2 No Back & Forth in Action		
Chapter 17	**PROJECT UNDO HISTORY**	**2 Hour**
17.1 How Project Undo History Works 17.2 Project Undo History in Action 17.3 Project History/Project All Functions 17.3.1 Geometry 17.3.2 Color 17.3.3 Farthest		
Chapter 18	**XTRACTOR BRUSHES**	**5 Hour**
18.1 XTractor Brush Types & How They Works 18.1.1 From Brush 18.1.2 XTractor Brush 18.1.3. XTractor DragDot Brush 18.1.4 XTractor DragRect Brush 18.2 Xtractor Brush in Action 18.3 XtractorDot Brush in Action 18.4 XtractorDragRect Brush in Action		
Chapter 19	**FADE OPACITY**	**5 Hour**

Reference Book: ZBrush 2020 What’s New Guide by Pixologic

Semester - I

Paper-II

Course Type: Core Course Theory **Course Code:21AUPGD3D102**

Course Title: Polly Painting Techniques

Teaching Scheme	No. of Credits	Examination Scheme
5 Hours / Week	4	CE: 40Marks SEE: 60Marks

Course Objectives:

1. To introduce the fundamentals of visual design.
2. To develop the understanding of core concepts of modeling techniques.
3. Understanding the observation-based approach for creating realism.
4. Creating photorealistic outputs using various renderers.
5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1. Explore the various techniques & concepts of animation.
2. Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**Texturing Workflow**	**4 Hour**

1.1 Game Texturing Pipeline
1.2 Useful Tips for Texture Artists
1.3 What Is UV Mapping?
1.4 Types of Textures

Chapter 2	**Texturing Games vs. Texturing Movies**	**2.5 Hour**

2.1 Texture Pipeline for Movies
2.2 Texture Pipeline for Games
2.3 Common Pipelines and Similarities for Games and Films

Chapter 3	**PBR Texturing vs. Traditional Texturing**	**3.5 Hour**
3.1 Texturing Using 3D Painting Applications 3.2 Texturing Using 2D Painting Applications 3.3 PBR Textures in the Gaming Industry		
Chapter 4	**Substance Suite and Substance Painter**	**4 Hour**
4.1 Why Substance? 4.2 Uses of Other Substance Suite Applications 4.2.1 Substance Source 4.2.2 Substance Alchemist 4.2.3 Substance Designer		
Chapter 5	**Hardware Specifications for Your Computer**	**4 Hour**
5.1 GPU vs. CPU 5.2 Recommended Hardware		
Chapter 6	**Painters' Graphical User Interface**	**6 Hour**
6.1 The UI and Tools 6.2 Guide to the Shelf		
Chapter 7	**Viewport Navigation in Painter**	**4 Hour**
7.1 Keyboard Shortcuts 7.2 Guide to Commonly Used Tools		
Chapter 8	**Setting Up a Project**	**4 Hour**
8.1 Getting Started with Substance Painter 8.2 Project Configuration in Detail		
Chapter 9	**Baking and the Importance of Mesh Maps**	**4 Hour**
9.1 Introduction to the Baker 9.2 Uses of Mesh Maps		
Chapter 10	**Working with Materials, Layers, and Masks**	**3 Hour**

10.1 Materials and Smart Materials 10.2 Layers and Masks 10.3 Layer Operations 10.4 Masks 10.5 Smart Masks 10.6 Mask Operations		
Chapter 11	**Working with Procedural Maps**	**5 Hour**
11.1 Filters 11.1.1 Applying a Filter 11.1.2 Commonly Used Filters 11.2 Generators 11.2.1 Dirt Generator 11.2.2 Metal Edge Wear Generator 11.2.3 Dripping Rust Generator 11.2.4 Auto Stitcher 11.2.5 Mask Builder – Legacy and Mask Editor 11.3 Uses of Grunges and Other Procedural Maps 11.3.1 Using Patterns as Height 11.3.2 Patterns as Masks 11.3.3Procedural Images as Maps		
Chapter 12	**Substance Anchors**	**2 Hour**
12.1 What Is an Anchor? 12.2 Using Anchor Points in a Practical Way		
Chapter 13	**Rendering with Iray**	**4 Hour**
13.1 Launching the Renderer 13.2Renderer Settings		
Chapter 14	**Integrating with Blender, Maya, and Marmoset**	**6 Hour**

14.1 Low Poly and High Poly Workflow
14.2 Blender to Substance Workflow
14.3 Maya to Substance Painter Workflow
14.4 Importing into Blender, Maya, and Marmoset
14.4.1 Exporting from Substance for Use in Blender
14.4.2 Exporting from Substance for Use in Maya
14.4.3 Exporting from Substance for Use in Marmoset Toolbag.

Chapter 15	**Rendering a Portfolio**	**1 Hour**

15.1 Integration with Blender
15.2 Integration with Maya
15.3 Integration with Marmoset Toolbag

Chapter 16	**Integration with Unreal Engine 4**	**2 Hour**

16.1 Exporting to Unreal Engine 4
16.2 Importing into Unreal Engine 4

Chapter 17	**Tips and Tricks of Substance Painter**	**1 Hour**

17.1 Using Brushes and Alphas
17.2 Creating Stitches
17.3 Creating Damage Using the Height Channel

Reference Books:

Beginning PBR Texturing: Abhishek Kumar: Apress Publications

Semester - I

Paper - III

Course Type: Core Course Theory **Course Code:21AUPGD3D103**

Course Title: Digital Lighting and Rendering

Teaching Scheme	No. of Credits	Examination Scheme
5 Hours / Week	4	CE: 40Marks SEE: 60Marks

Course Objectives:

1. To introduce the fundamentals of visual design.
2. To develop the understanding of core concepts of modeling techniques.
3. Understanding the observation-based approach for creating realism.
4. Creating photorealistic outputs using various renderers.
5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1. Explore the various techniques & concepts of animation.
2. Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**Fundamentals of Lighting Design**	**5 Hour**

1.1 Motivation
1.2 Cheating
1.3 Visual Goals of Lighting Design
1.4 Lighting Challenges
1.5 Your Workspace
1.6 Creative Control

Chapter 2	**Lighting Basics and Good Practices**	**5 Hour**

2.1 Starting the Creative Process
2.2 Types of Lights
2.3 Adjusting Controls and Options

Chapter 3	**Shadows and Occlusion**	**5 Hour**
3.1 The Visual Functions of Shadows 3.2 The Appearance of Shadows 3.3 Shadow Algorithms 3.4 Occlusion 3.5 Faking Shadows and Occlusion		
Chapter 4	**Lighting Environments and Architecture**	**5 Hour**
4.1 Creating Daylight 4.2 Working with Indoor Natural Light 4.3 Practical Lights 4.4 Night Scenes 4.5 Distance and Depth		
Chapter 5	**Lighting Creatures, Characters, and Animation**	**5 Hour**
5.1 Modeling with Light 5.2 Three-Point Lighting 5.3 Functions of Lights 5.4 Issues in Lighting Character Animation		
Chapter 6	**Cameras and Exposure**	**5 Hour**
6.1 F-Stops and Depth of Field 6.2 Shutter Speed and Motion Blur 6.3 Film Speed and Film Grain 6.4 Photographic Exposure 6.5 Matching Lens Imperfections		
Chapter 7	**Composition and Staging**	**5 Hour**
7.1 Types of Shot 7.2 Camera Angles 7.3 Improving Your Composition 7.4 Framing for Film and Video		
Chapter 8	**The Art and Science of Color**	**5 Hour**

8.1 Working in a Linear Workflow
8.2 Color Mixing
8.3 Developing Color Schemes
8.4 Using Color Balance
8.5 Working with Digital Color

Chapter 9	**Shaders and Rendering Algorithms**	**5 Hour**

9.1 Shading Surfaces
9.2 Anti-Aliasing
9.3 Raytracing
9.4 Reyes Algorithms
9.5 Global Illumination
9.6 Caustics

Chapter 10	**Designing and Assigning Textures**	**5 Hour**

10.1 Mapping Surface Attributes
10.2 Aligning Maps with Models
10.3 Creating Texture Maps
10.4 Using Procedural Textures

Chapter 11	**Rendering in Layers and Passes for Compositing**	**5 Hour**

11.1 Rendering in Layers
11.2 Rendering in Passes
11.3 Matching Live-Action Background Plates
11.4 Managing Colors in Your Composite
11.5 Choosing Your Approach

Chapter 12	**Production Pipelines and Professional Practices**	**5 Hour**

12.1 Production Pipelines
12.2 Lighting on Larger Productions
12.3 Advancing in Your Career

Reference Books:[digital] LIGHTING & RENDERING Jeremy BirnThird Edition new rider's publications.

Semester - I
Paper - IV

Course Type: Core Course Practical **CourseCode:21AUPGD3D104**

Title: Modeling and Sculpting

Teaching Scheme	No. of Credits	Examination Scheme
4hrs 20 mins Hrs/week	4	CE: 40 Marks SEE: 60Marks

Course Objectives

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.

Course Outcomes:-

On completion of this course, students will be able to :

1.Creating real-world simulation effects.
2. Creating realistic looking fluids & rigid body simulations.
3.Recognize the importance of render passes.
4. Creating photorealistic outputs with compositing.

Guidelines :

Lab Book: 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.

Submission:

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.

Texturing:

Assignments should be done individually by the student. The submission should include a JPEG image..

Assessment:

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.

Operating Environment:

For Modeling/Sculpting

Operating system: Windows 10

Software: Autodesk Maya, Zbrush

Suggested List of Assignments:

A) Modeling

Assignment 1.

Vehicle Modeling.

Assignment 2.

Stylized Character Modeling & Texturing

Assignment 3.

Low Poly Character Modeling & Texturing (Maya/Zbrush)

B)Sculpting

Assignment 1.

Digital Sculpting with Zbrush(the art of sculpting)

Assignment 2.

Realistic Character Modeling & Texturing(Maya/ZBrush)

Assignment 3.

Sculpting & Blend Shapes

Books: Laboratory handbook

Semester - I
Paper - V

Course Type: Core Course Practical **CourseCode:21AUPGD3D105**

Title: Advanced shading and Texturing

Teaching Scheme	No. of Credits	Examination Scheme CE:
4hrs 20 mins Hrs/week	4	40Marks SEE: 60Marks

Course Objectives

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.

Course Outcomes:-

On completion of this course, students will be able to :

1. Creating real-world simulations effects.
2. Creating realistic looking fluids & rigid body simulations.
3. Recognize the importance of render passes.
4. Creating photorealistic outputs with compositing.

Guidelines :

Lab Book: 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.

Submission:

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.

Modeling

Assignments should be done individually by the student. The submission should include either the playblast or a compiled sequence render of simulation with lighting.

Assessment:

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.

Operating Environment:

For Modeling/Sculpting

Operating system: Windows 10

Software: Autodesk Maya, Zbrush

Suggested List of Assignments:

A) Shading

Assignment 1.

Stylized Character Texturing.

Assignment 2.

Uv Layout - Planning, Techniques

Assignment 3.

Texturing - Planning,Techniques,Basics,Details,file Cleanup ,Final Touchup

B)Texturing

Assignment 1.

UV space and Texturing, Poly paint, Z App link.

Assignment 2.

Realistic Character Texturing(Maya/ZBrush/Arnold)

Assignment 3.

Pass extraction and composition

Books: Laboratory handbook

Semester - I
Paper - VI

Course Type: Core Course Practical **CourseCode:21AUPGD3D106**

Title: Advanced Lighting

Teaching Scheme	No. of Credits	Examination Scheme CE:
4hrs 20 mins Hrs/week	4	40Marks SEE: 60Marks

Course Objectives

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.

Course Outcomes:-

On completion of this course, students will be able to :

1. Creating real-world simulations effects.
2. Creating realistic looking fluids & rigid body simulations.
3. Recognize the importance of render passes.
4. Creating photorealistic outputs with compositing.

Guidelines :

Lab Book: 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.

Submission:

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.

Lighting

Assignments should be done individually by the student. The submission should include either the playblast or a compiled sequence render of simulation with lighting.

Assessment:

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.

Operating Environment:

For Modeling/Sculpting

Operating system: Windows 10

Software: Autodesk Maya, Zbrush.Arnold

Suggested List of Assignments:

A) Lighting

Assignment 1.

CG Lighting & Use of Shaders.

Assignment 2.

Lighting Environments and Architecture

Assignment 3.

Arnold Shaders

Books: Laboratory handbook

Semester - I
Paper - VII

Course Type: Core Course Practical **CourseCode:21AUPGD3D107**

Title: Rendering and Compositing

Teaching Scheme	No. of Credits	Examination Scheme CE:
4hrs 20 mins Hrs/week	4	40Marks SEE: 60Marks

Course Objectives

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.

Course Outcomes:-

On completion of this course, students will be able to :

1. Creating real-world simulations effects.
2. Creating realistic looking fluids & rigid body simulations.
3. Recognize the importance of render passes.
4. Creating photorealistic outputs with compositing.

Guidelines :

Lab Book: 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.

Submission:

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.

Modeling

Assignments should be done individually by the student. The submission should include either the playblast or a compiled sequence render of simulation with lighting.

Assessment:

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.

Operating Environment:

For Modeling/Sculpting

Operating system: Windows 10

Software: Autodesk Maya, Zbrush/Arnold, Nuke

Suggested List of Assignments:

A) Passes compositing

Assignment 1.

Lighting a Scene with Passes

Assignment 2.

BG lighting with multiple passes

Assignment 3.

Character lighting with multiple passes

Assignment 4.

Lighting for an underwater scene

Assignment 5.

Lighting for FX shot

Books: Laboratory handbook

3d Animation (PG Diploma Question Paper Pattern)

a. **Evaluation Criteria :** The evaluation of students will be based on three parameters:-
   - Continuous Internal Evaluation (CIE).
   - Practical / Project Examination
   - Semester End Examination.

i. **For Continuous Internal Evaluation (CIE):** Internal assessment will be as follows:

Theory Examination

Credits :4 **Duration : 1Hr/Exam** **Marks:40**			
10 Marks **Academic Performance**	**10 Marks** **Spirit of Collaboration**	**10 Marks** **Quiz Submission**	**10 Marks** **Class Test**
Attendance	Active participation in class activities.	Submission of end module quizzes on regular basis	Minimum 40% marks required to get marks for class test.

ii. **For Practical/Project Examination:** Internal assessment will be as follows:

Practical **Credits :4** **Marks:40**			**Project** **Credits :6** **Marks:60**		
10 marks	**20 Marks**	**10 Marks**	**20 marks**	**20 Marks**	**20 Marks**

Attendance	Assignment submission on time	Lab Course Book / Journal	Idea and Originality	**accuracy** and reliability	Presentation

For Semester End Examination: The Duration of the SEE will be as follows:

For Theory Examination

Credits: 4 **Duration : 2.5 hrs**		**Marks : 60**
Q1	**Q2**	**Q3**
10 marks	**20 marks**	**30 marks**
Short answers **(any 5)** Each carry 4 marks)	Descriptive **(any 2)** Each carry 10 marks	Multi choice questions **(any 15**) Each carry 2 marks

For Practical/Project Examination

Practical **Credits : 4 Marks:60** **Duration : 3.5 Hours**						**Project** **Credits :4 Marks :60** **Duration : 3.5 Hours**	
Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Portfolio**	**Project Presentation And Design**
10 marks	10 marks	10 marks	10 marks	10 marks	10 marks	30 marks	30

Semester 2

Semester - II

Paper - I

Course Type: Core Course Theory **Course Code:21AUPGD3D201**

Course Title : Advance Rigging

Teaching Scheme	No. of Credits	Examination Scheme
5 Hours / Week	4	CE: 40Marks SEE: 60Marks

Course Objectives:

1. To introduce the fundamentals of visual design.
2. To develop the understanding of core concepts of modeling techniques.
3. Understanding the observation-based approach for creating realism.
4. Creating photorealistic outputs using various renderers.
5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1.Explore the various techniques & concepts of animation.

2.Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**Introduction to Rigging**	**8 Hour**

1.1 Introduction
1.2 Outcomes
1.3 Terminology

Chapter 2	**Working with Constraints**	**9 Hour**

2.1 Adding/Removing a Constraint
2.2 Relationship
2.3 Child of Constraint

Chapter 3	**Introduction to Working with Armature**	**8 Hour**

3.1 Introduction
3.2 Outcomes
3.3 Terminology
3.4 Working with Armature
3.5 If the Active Element is a Disconnected Root:
3.6 If the Active Element is a Connected Root:
3.7 Armature Deform Parent

Chapter 4	**Introduction to Working with Armature Part II**	**8 Hour**

4.1 With Automatic Weights
4.2 Unit summary
4.3 Assignment
4.4 Assessment
4.5 Resources

Chapter 5	**Skinning and Advanced Deformers**	**10 Hour**

5.0 Introduction
5.1 Unit Objectives
5.2 Introduction to Skinning
  5.2.1 Methods of Skinning
  5.2.2 Changing a skinned Object's deformation order
  5.2.3 Point tweaking skinned objects
  5.2.4 Editing node behavior to improve performance
  5.2.5 Workflow summary
5.3 Rigid skinning
  5.3.1 Understanding Rigid Skinning
  5.3.2 Rigid Bind Process
  5.3.3 Editing Rigid Skin
  5.3.4 Flexors
5.4 Tutorial on Smooth Skinning a Character
  5.4.1 Understanding Smooth Skinning
  5.4.2 Binding Smooth Skin
  5.4.3 Editing smooth skin
  5.4.4 Using Smooth Skin Influence Objects
  5.4.5 Instances

Chapter 6	**Connecting Attributes**	**10 Hour**

6.0 Introduction
6.1 Unit Objectives
6.2 Dependency Graph
  6.2.1 Nodes
  6.2.2 Attributes
  6.2.3 Connections
  6.2.4 Types of Connections
  6.2.5 Keyed Relationships
6.3 Expressions
  6.3.1 Animation Expressions
  6.3.2 Creating Animation Expressions
  6.3.3 Attributes and Drivers
  6.3.4 Time and Frame Keywords
  6.3.5 Editing Expressions
  6.3.6 Editing Text in Animation Expression
  6.3.7 Animation Expression with Text Editor
  6.3.8 Deleting Animation Expression
6.4 Understanding Constraints
  6.4.1 Constraint Node Behavior
  6.4.2 Enabling and Disabling Constraint Nodes
  6.4.3 Workflow Summary
  6.4.4 Using Point Constraints
  6.4.5 Using Geometry Constraints

Chapter 7	**Character Controls**	**7 Hour**

7.0 Introduction
7.1 Unit Objectives
7.2 Characters
  7.2.1 Character Node Behaviour
  7.2.2 Defining Characters
  7.2.3 Creating Characters
  7.2.4 Editing Characters
  7.2.5 Deleting Characters
  7.2.6 Animating Characters
7.3 Introducing Skeletons
  7.3.1 Understanding Skeletons
  7.3.2 Editing Node Behaviour to Improve Performance
  7.3.3 Workflow Summary
7.4 Building Skeletons

7.4.1 Understanding Skeleton Construction
7.4.2 Creating Joint Chains and Limbs
7.4.3 Editing Joints
7.5 Posing Skeletons
7.5.1 Forward Kinematics
7.5.2 Inverse Kinematics
7.5.3 Handles and Chains of Inverse Kinematics
7.6 Tutorial on Building a Control Rig
7.6.1 Control Objects
7.6.2 Rig Controls
7.6.3 IK or FK
7.6.4 Setup Theory
7.6.5 The Hips
7.6.6 The Legs and Feet
7.6.7 Automatic Foot Roll
7.6.8 Arms and Wrist
7.6.9 Shoulder Blades
7.6.10 Chain Up Vectors: The Third Dimension
7.6.11 Controlling the Head Using a Position and Orientation Constraint
7.6.12 Invert the Constraints
7.6.13 Fine-Tuning and Parenting the Rig
7.6.14 Creating a Model Space

Reference Books: CHARACTER SETUP AND ANIMATION IN MAYA, Rohan Page
3D Animation Block –III: 3D Animation & Rigging,ODL

Semester - II

Paper-II

Course Type: Core Course Theory **Course Code:21AUPGD3D202**

Course Title: Digital Animation

Teaching Scheme 5 Hours / Week	No. of Credits 4	Examination Scheme CE: 40Marks SEE: 60Marks

Course Objectives:

1. To introduce the fundamentals of visual design.
2. To develop the understanding of core concepts of modeling techniques.
3. Understanding the observation-based approach for creating realism.
4. Creating photorealistic outputs using various renderers.
5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1. Explore the various techniques & concepts of animation.
2. Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**Animation Basics**	**12 Hour**

1.1 About Animation in Maya
1.2 Controlling animation
1.3 Previewing animation
1.4 Muting animation
1.5 Adding sound to your animation
1.6 Baking simulations
1.7 Animation Snapshot and Animated Sweep
1.8 How do I? Use basic animation features
1.9 Edit animation preferences
1.10 Use the animation controls
  1.10.1 Preview your animation
  1.10.2 Ghost an object
  1.10.3 Change the status of a mute node from the Channel Box
1.11Apply Motion Trails to an object
1.12 Playback animation
  1.12.1 Display the frame rate of an animation
  1.12.2 Improve animation playback performance
  1.12.3 Playblast animation

Chapter 2	**Keyframe Animation**	**12 Hour**

2.1 About Keys
2.2 Auto Key
2.3 Keys in the Attribute Editor
2.4 Keys in the Channel Box, Graph Editor, and Dope Sheet
2.5 Cutting, copying, and pasting keys between scenes
2.6 Keys clipboard
2.7 Driven keys
2.8 Breakdowns
2.9 Inbetweens
2.10 Graph Editor overview
2.10.1 Dope Sheet
2.10.2 How do I? Set keys
2.11.Set key preferences
2.11.1 Add keys
2.11.2 Set key options
2.11.3 Modify key attributes
2.11.4 Edit the key ability of an object
2.11.5 Disable the editability of attributes without deleting them
2.12 Edit keys
2.12.1 Cut keys
2.12.2 Copy keys
2.12.3 Paste keys
2.12.4 Delete keys
2.12.5 Scale keys
2.12.6 Snap keys
2.12.7Bake keys
2.12.8 Use Auto Key
2.12.9 Use Auto Key
2.13 Set Breakdowns
2.14 Set Breakdowns
2.15 Convert keys to Breakdowns
2.16 Convert Breakdowns to keys
2.17 Set Inbetweens
2.18 Set Inbetweens
2.19 Set Driven Keys
2.20 Set Driven Keys
2.21 Set a driven key relationship

Chapter 3	**Use the Graph Editor and Dope Sheet**	**12 Hour**

3.1 Display the Graph Editor and Dope Sheet
3.2 Navigate the Graph Editor graph view or Dope Sheet view area
3.3 Mute or unmute a channel in the Dope Sheet or Graph Editor
3.4 Mute keys in the Dope Sheet or Graph Editor
3.5 Edit curves
3.6 View curves while editing
3.7 Set curve behavior
  3.7.1 Set rotation interpolation for curves
  3.7.2 Smooth curves
  3.7.3 Simplify curves
3.8 Resample curves
3.9 Scale curves
3.10 Fix my curves when they have been corrupted

Chapter 4	**Nonlinear Animation**	**12 Hour**

4.1 About Nonlinear animation.
  4.1.1 Nonlinear animation tools in Maya.
  4.1.2 Nonlinear animation components in Trax
4.2. How do I? Open and view the Trax Editor
  4.2.1 Open the Trax Editor
  4.2.2 Set the Trax Editor view
  4.2.3Set the Time Slider's playback range to reflect
    the range of clips in Trax
  4.2.4 Use the Outliner and Visor with Trax.
  4.2.5 Use the Outliner with Trax
  4.2.6 Use the Visor with Trax
4.3 Create, load, and highlight character sets.
  4.3.1 Create character sets
  4.3.2 Load character sets.
  4.3.3 Highlight characters, groups, or sub-characters in Trax
  4.3.4Collapse, expand, and edit summaries
4.4 Expand and collapse a summary track
4.5 Edit the summary clip
4.6 Create clips and poses
4.7 Create clips.
4.8 Create expression or constraint clips
4.9 Create poses
  4.9.1 Cut, copy and paste clips
  4.9.2 Duplicate clips

4.9.3 Manipulate clips
4.9.4 Edit a clip's weighting
4.9.5 Move clips
4.9.6 Trim clips
4.9.7 Scale clips
4.9.8 Cycle clips
4.9.9 Hold clips
4.9.10 Split clips
4.9.11 Merge clips
4.9.12 Enable or disable clips
4.9.13 Activate or deactivate clips
4.9.14 Create and edit blends
4.10 Create and edit time warps

Chapter 5	**Motion Capture Animation**	**12 Hour**

5.1 About Motion capture devices
5.2 Motion capture devices
5.2.1 Server
5.2.2 Axis
5.2.3Button
5.2.4 Attachments
5.2.5 Virtual devices
5.2.6 Multiple devices
5.3 Motion capture systems
5.3.1 Optical capture system.
5.3.2 Magnetic capture system
5.3.3 Motion capture process
5.3.4 Rehearsing the motion
5.3.5 Recording the motion.
5.3.6 Reviewing the motion
5.4 Filters and Resamplers
5.6 Saving files to disk
5.7 Motion capture tips
5.8 Tips for full-body motion capture
5.9 Tips for working with the data.

Reference Books: Animation Version 6, Alias

Semester - II

Paper - III

Course Type: Core Course Theory **Course Code:21AUPGD3D203**

Course Title: Compositing for 3d

Teaching Scheme	No. of Credits	Examination Scheme
5 Hours / Week	4	CE : 40Marks SEE: 60Marks

Course Objectives:

1. To introduce the fundamentals of visual design.
2. To develop the understanding of core concepts of modeling techniques.
3. Understanding the observation-based approach for creating realism.
4. Creating photorealistic outputs using various renderers.
5. Understanding the body dynamics & principles of animation.

Course Outcomes: On completion of this course, students will be able to :

1. Explore the various techniques & concepts of animation.
2. Develop & create effective 3D art with visualization & concept.

Course Contents

Chapter 1	**The Nuke Interface**	**5 Hour**

1.1 Navigating the interface
1.2 Building Node Graphs
1.3 Creating keyframes
1.4 The Curve Editor

Chapter 2	**Transformations and Animation**	**5 Hour**

2.1 Keyframe animation
2.2 Math expressions and linking
2.3 Creating animated elements
2.4 Correcting for lens distortion

Chapter 3	**Color and Rotoscoping**	**5 Hour**

3.1 Nuke's color management
3.2 Color correcting composites
3.3 Rotoscoping
3.4 Masking operations

Chapter 4	**Compositing CGI and Channels**	**5 Hour**

4.1 Mastering Nuke's channels system
4.2 Multi-pass CG compositing
4.3 Adding motion blur
4.4 Adding depth of field

Chapter 5	**Keying**	**5 Hour**

5.1 Lumakeys
5.2 All four of Nuke's chroma keyers
5.3 Proper use of Addmix and Keymix nodes
5.4 How to merge multiple keys

Chapter 6	**Tracking, Warping, and Retiming**	**5 Hour**

6.1 The Tracker node
6.2 How to do a match move
6.3 Spline warp and Grid warp
6.4 Retiming clips with optical flow

Chapter 7	**3D Basics**	**5 Hour**
7.1 Navigating Nuke's 3D workspace 7.2 Working with geometric primitives 7.3 Projecting texture maps 7.4 Rendering 3D scenes		
Chapter 8	**3D Animation and Shaders**	**5 Hour**
8.1 Animating 3D geometry 8.2 Deforming 3D geometry 8.3 Adding lights, shaders, and materials to geometry 8.4 Normals relighting		
Chapter 9	**Production Workflows**	**5 Hour**
9.1 Adding a 3D background to a CG render 9.2 Camera projection 9.3 Rig removal 9.4 Set extension		
Chapter 10	**Keying**	**5 Hour**
10.1 Camera Tracking 10.2 How to do camera tracking 10.3 Converting point clouds to meshes 10.4 Compensating for lens distortion 10.5 Getting 3D information to the 2D composite		
Chapter 11	**Planar Tracker and Particles**	**5 Hour**
11.1 How to do planar tracking 11.2 How to use planar tracking results 11.3 Using Nuke's 3D particle system 11.4 Creating your own particles		
Chapter 12	**Advanced 3D Nodes**	**5 Hour**
12.1 Deep compositing 12.2 Alembic geometry 12.3 Modeling 3D geometry from a 2D scene		

12.4 Creating point clouds from CG renders
Reference Books: Nuke VFX Compositing Course with Steve Wright

Semester - II
Paper - IV

Course Type: Core Course Practical **CourseCode:21AUPGD3D204**

Title: Character setup

Teaching Scheme	No. of Credits	Examination Scheme
4hrs 20 mins Hrs/week	4	CE: 40Marks SEE: 60Marks

Course Objectives

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.

Course Outcomes:-

On completion of this course, students will be able to :

1. Creating real-world simulations effects.
2. Creating realistic looking fluids & rigid body simulations.
3. Recognize the importance of render passes.
4. Creating photorealistic outputs with compositing.

Guidelines :

Lab Book: 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.

Submission:

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.

Character Setup(Rigging/Animation):

Assignments should be done individually by the student. The submission should include a final render video.

Assessment:

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.

Operating Environment:

For Rigging/Animation

Operating system: Windows 10

Software: Autodesk Maya, Zbrush.Arnold, Nuke

Suggested List of Assignments:

A) Rigging

Assignment 1.

Human and Animal Anatomy. Body mechanics

Assignment 2.

Body rigging I. Basic rigging structures

Assignment 3.

Body rigging II. Advanced structures

Assignment 4.

Dynamic Rig and Basic Simulations. Secondary Animation Systems

Assignment 5.

Facial Anatomy. Facial Musculature

Assignment 6.

Facial Rigging: fundamentals

Assignment 7.

Structure and design of facial systems

Assignment 8.

Facial Rigging: control and distortion

Assignment 9.

Distortion I. Skin Systems. Conceptualization. Technology. Processes and methods

B)Animation

Assignment 1.

Walk and Stop - Weight Shift

Assignment 2.

Head Turn and Eyeblink.

Assignment 3.

Hand and Head Gesture.

Assignment 4.

Character Jump and Settle - Blocking and Key Posing

Assignment 5.

Character Jump and Settle - Finalizing the shot

Assignment 6.

Quadruped Walk Cycle

Assignment 7.

Mechanical Animation- Vehicle animation

Assignment 8.

Animation for VFX- Rotomation

Assignment 9.

Baking, Importing and exporting animation

Books: Laboratory handbook

3d Animation (PG Diploma Question Paper Pattern)

b. **Evaluation Criteria :** The evaluation of students will be based on three parameters:-

- Continuous Internal Evaluation (CIE).
- Practical / Project Examination
- Semester End Examination.

iii. **For Continuous Internal Evaluation (CIE):** Internal assessment will be as follows:

Theory Examination

Credits :4 Duration : 1Hr/Exam Marks:40			
10 Marks **Academic Performance**	**10 Marks** **Spirit of Collaboration**	**10 Marks** **Quiz Submission**	**10 Marks** **Class Test**
Attendance	Active participation in class activities.	Submission of end module quizzes on regular basis	Minimum 40% marks required to get marks for class test.

iv. For Practical/Project Examination: Internal assessment will be as follows:

Practical **Credits :4** **Marks:40**			**Project** **Credits :6** **Marks:60**		
10 marks	**20 Marks**	**10 Marks**	**20 marks**	**20 Marks**	**20 Marks**
Attendance	Assignment submission on time	Lab Course Book / Journal	Idea and Originality	**accuracy** and reliability	Presentation

For Semester End Examination: The Duration of the SEE will be as follows:

For Theory Examination

Credits: 4 **Marks : 60** **Duration : 2.5 hrs**		
Q1	**Q2**	**Q3**

10 marks	**20 marks**	**30 marks**
Short answers **(any 5)** Each carry 4 marks)	Descriptive **(any 2)** Each carry 10 marks	Multi choice questions **(any 15**) Each carry 2 marks

For Practical/Project Examination

Practical Credits : 4 Marks:60 Duration : 3.5 Hours						**Project Credits :4 Marks :60 Duration : 3.5 Hours**	
Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Portfolio**	**Project Presentation And Design**
10 marks	10 marks	10 marks	10 marks	10 marks	10 marks	30 marks	30