Savitribai Phule Pune University

Skill Development Centre

BATCHELOR IN VOCATIONAL **(B.Voc.)** 2020-21

Digital Art and Animation

(3 years Degree Course)

Pune District Education Association's

Anantrao Pawar College, Pirangut, Pune.

Objective

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the program.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry is also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out of 10+2 with vocational subjects.
- Demonstrate creativity and technical expertise for content creation
- Promote and develop the opportunities in the field of multimedia where as students can be eligible to demonstrate and explore the skills acquired.
- Develop in house capabilities to create talent with the ongoing revolution of media requirements.

SEM 5 - 3d Animation

CODE	SUBJECT	HOURS/DAY	LECTURES	TH	PR	CREDIT
BVOC 125	3d Design – 3d Pipeline, Modelling, Texturing	1	36	T		4
BVOC 126	3d Design - Rigging, Animation, Dynamics	1	36	T		4
BVOC 127	3d Design - Lights, Camera, Render	1	36	T		4
BVOC 128	3d Animation Assessment's	4	30		P	6
BVOC 129	Presentation on 3d Animation production Pipeline	4	30		P	6
BVOC 130	Hands on Training (Project – 3D Animation Film)	6	15		P	6
			285	3	3	30

SEM 6 – Visual Effects

CODE	SUBJECT	HOURS/DAY	LECTURES	TH	PR	CREDIT
BVOC 131	Introduction to Vfx, Roto and Paint	1	36	T		4
BVOC 132	Tracking, Matchmove and Rotomation	1	36	T		4
BVOC 133	Greenscreen, Matte painting And Compositing	1	36	T		4
BVOC 134	Visual FX Assessment	4	30		P	6
BVOC 135	Green Screen Shoot Outdoor/indoor Practical	4	30		P	6
BVOC 136	Hands on Training (Project – VFX Film Making)	6	15		P	6
		30	4	30	4	30

Course Type: Core Credit Course Code: BVOC 125

Paper-1: 3d Design – 3d Pipeline, Modelling, Texturing

Teaching Scheme	No. of Credits	Examination Scheme
4 Hours / Week	4	IE: 50 Marks UE: 50 Marks

Objective

1. Getting ready with pile knowledge of the 3d film making.
2. Getting latest trends, workflows, culture, quality check criteria's and so on.

Outcome

1. Students will explore about field, on floor pipeline and issues and overcome further situation.
2. Explore it infrastructure, deadlines, asset management and management strategies.

Chapter 1	Introduction	2 Hours

1. Production Pipeline Fundamentals for Film and Games
2. How This Book Will Help You
3. What is a Pipeline?
4. Differences and Similarities Between Film and Game Pipelines
5. An Overview of a Film Production
6. An Overview of a Game Production
7. Remember: Each Production is Unique

Chapter 2	The Stages of Production	2 Hours

1. What You Will Learn from This Chapter
2. The Economics of Film Production
3. The Economics of Game Production
4. The Stages of Production
5. Other Language Barriers
6. Pre-Production: An Overview
7. Pre-Production in the Film Pipeline
8. Pre-Production in the Games Pipeline
9. Production: An Overview
10. Production in the Film Pipeline
11. Production in the Games Pipeline
12. Post-Production or Finalling: An Overview
13. Post-Production in the Film Pipeline
14. Finalling in the Games Pipeline

Chapter 3	Asset Creation for Film	2 Hours

1. What You Will Learn from This Chapter
2. LIDAR and On-Set Survey Data
3. Match-Moving, Rotoscoping and Plate Preparation
4. Modeling
5. Shaders and Textures
6. Shot Layout
7. Rigging
8. Animation
9. Effects and Simulations
10. Lighting
11. Rendering
12. Compositing
13. LIDAR: Asset Capture on Set

Chapter 4	**Asset Creation for Games**	2 Hours

1. Data Import and Export
2. Levels of Detail
3. Optimizing Assets
4. Creating Run-Time Animation
5. In-Game Facial Animation
6. Effects and FX
7. System and Level Design
8. Rendering and Shader Management

Chapter 5	**The Basic Functionality of a Pipeline**	2 Hours

1. What Pipelines Do
2. Why Pipelines Change
3. Defining Your Goals
4. Defining Standards
5. File-Exchange Formats and Scripting Languages
6. Micro Pipelines
7. Strategies for Managing Data: An Overview
8. Directory Structure
9. File-Naming Conventions
10. Metadata
11. Building an Asset Browser
12. Versioning and Version Control
13. Good Version-Control Policies
14. Asset Review and Approval
15. Tracking Production Data

Chapter 6	**Systems Infrastructure**	4 Hours

1. IT for Film: Types of Hardware
2. IT for Film: The Storage Cluster
3. IT for Film: The Render Farm
4. IT for Film: Managing the Infrastructure
5. IT for Games: The Build Farm
6. IT for Games: Version Control
7. Managing Operating Systems
8. Managing Utility Software
9. Production Security

Chapter 7	**Mitigating Risk Through Regular Maintenance and Disaster Planning**	2 Hours

1. Interlude: Planned Downtimes
2. Interlude: General Guidelines
3. Interlude: Regular Maintenance Window
4. Interlude : Incremental Downtime
5. Interlude: Roll-Overs

Chapter 8	Software for a Studio Environment	3 Hours

1. Ours and Theirs: Approaches to Pipeline Software Development
2. When to Build, When to Buy, and When to Tinker
3. Buying In Software: Points to Consider
4. Working with Open-Source Software
5. Scripting and Tinkering
6. Developing Software In-House: the Role of the R&D Department
7. Developing Software In-House: Who to Recruit
8. Developing Software In-House: Development Policy
9. Developing Software In-House: Testing New Tools
10. Developing Software In-House: Developing a Release Policy
11. Developing Software In-House: Producing Documentation
12. Developing Software In-House: Reporting Errors

Chapter 9	Diving Deeper Into Data Management	3 Hours

1. What You Will Learn From This Chapter
2. How Data-Management Workflow Evolves
3. Directory Structures: Flat Versus Deep Structures
4. Directory Structures for Film
5. Directory Structures for Games
6. Directory Structures: Designing for Ease of Navigation
7. Directory Structures: Planning Shared Asset Use
8. Directory Structures: Building From Most to Least Generic
9. Directory Structures: Incorporating Asset Templates
10. File-Naming Conventions: Common Syntax
11. File-Naming Conventions: Mirroring the Folder Structure in the File Name
12. Version Control: Exclusive and Non-Exclusive File Access
13. Version Control: Treating Code and Art Assets Separately
14. Version Control: Handling Special Projects
15. Metadata: Embedded Versus Extracted Data
16. Metadata: Flat Files Versus Databases
17. Databases: Relational and Non-Relational Databases
18. Databases: Choosing a Database Structure
19. What is Metadata?

Chapter 10	Asset Management	3 Hours

1. What is Asset Management?
2. The Goals of Asset Management
3. How Asset Management Differs Between Film and Games

4. Dependency Tracking: What is Asset Dependency?
5. Dependency Tracking: Upstream and Downstream Dependency
6. Dependency Tracking: Manual Versus Automated Systems
7. Dependency Tracking: Storing Dependency Data
8. Dependency Tracking: Visualizing Dependencies
9. Dependency Tracking: Resolving Implicit Dependencies
10. Dependency Tracking: Caching Queries

11. Dependency Tracking: Grouping Assets

Chapter 10	Production Management	3 Hours

1. Production-Management Strategies: Agile Versus Waterfall Development
2. Production-Management Strategies: Maximizing Efficiency
3. Production-Management Strategies: Finishing On Time and On Budget
4. Production-Management Technology: An Overview
5. Production-Management Technology: Tracking Assets
6. Production-Management Technology: Managing Notes
7. Production-Management Technology: Reviewing Work
8. Production-Management Technology: Scheduling Tasks
9. Production-Management: One Final Thought.

Chapter 10	Color and Sound	3 Hours

1. Interlude: Color Management in Workflows
2. Interlude: A Day in the Life of a Motion Picture Sound File, Circa 0
3. Interlude: Audio Differences Between Live Action and Animation
4. Interlude: The Game Audio Pipeline
5. Interlude: Game Audio: D, D, Mono and Stereo
6. Interlude: Audio Flexibility in the Game Environment.

Chapter 10	Tying It All Together	3 Hours

1. Analyze the Business Requirements
2. Process Decisions from Workflow to Mapping the Organization
3. Technical and Infrastructure Decisions
4. The Unique Considerations of Film and Games
5. Building and Proving Pipelines
6. Development Methodologies
7. Further Education.

Chapter 10	Virtual Production in Film and Games	3 Hours

1. What is Virtual Production in Film?
2. Naming Conventions
3. The Standard Phases
4. What is Virtual Production in Games?
5. Virtual Production and Asset Creation/Capture
6. Future

Chapter 10	Upcoming Trends and Technologies	3 Hours

1. Open Standards and Open-Source Tools
2. WebGL and Associated Technologies
3. GPU Computing
4. Big Data

5. Virtual Production
6. High-Frame-Rate Cinema
7. Virtual Machines
8. Games as a Service
9. Pipelines as a Service

Chapter 10	**Cloud Computing for VFX**	3 Hours

1. Cloud Services
2. Using the Cloud
3. Collaboration

Reference books

- Production Pipeline Fundamentals for Film and Games

Paper-1: Modelling, Texturing

Objective

1. Provides an introduction to creating, editing, and analyzing 3D models. Develops foundational skills to work with, and navigate the digital 3D modeling workspace to create 3D objects. Examines basic elements of the 3D development of modeling, texturing, lighting, animating, and rendering.

Outcome

1. Work with and navigate the unique features of the digital 3D modeling workspace to create 3D objects.
2. Identify characteristics of rendering 3D objects for optimal system processing and analysis.
3. Create a 3D environment featuring lighting and textures.
4. Create basic 3D models and animations.
5. Evaluate digital 3D projects, identify items for improvement, and implement changes.

Chapter 1	**Introduction**	8Hours

1. Working in Autodesk Maya
2. Color Management
3. Creating and Editing Nodes
4. Creating Maya Projects

Chapter 2	**Hard-Surface Modeling**	8 Hours

1. Understanding Polygon Geometry
2. Understanding NURBS
3. Using Subdivision Surfaces
4. Employing Image Planes
5. Modeling NURBS Surfaces
6. Converting NURBS Surfaces to Polygons
7. Modeling with Polygons

Chapter 3	**Organic Modeling**	8 Hours

1. Implement Box Modeling
2. Employ Build-Out Modeling
3. Sculpt Polygons
4. Use Retopology Tools

Chapter 3	**Shaders**	8 Hours

1. ai user data shaders
2. aov shaders
3. color
4. conversion
5. displacement
6. math shaders
7. matrix shaders
8. maya shaders
9. shading engine
10. surface
11. texture shaders
12. utility shaders
13. volume shaders
14. third party shaders
15. legacy shaders

Chapter 4	**UV Texture Layout**	8 Hours

1. Bump and Normal Mapping
2. Displacement Mapping
3. Subsurface Scattering
4. ShaderFX

Reference books

- Mastering Autodesk Maya 2016: Autodesk Official Press

Course Type: Core Credit | Course Code: BVOC 126

Paper-3: 3d Design – Rigging, Animation

Teaching Scheme	**No. of Credits**	**Examination Scheme**
4 Hours / Week	4	IE:50 Marks UE:50 Marks

Objective

1) Provides an introduction to creating, editing, and analyzing 3D models. Develops foundational skills to work with, and navigate the digital 3D modeling workspace to create 3D objects. Examines basic elements of the 3D development of modeling, texturing, lighting, animating, and rendering.

Outcome

1) Work with and navigate the unique features of the digital 3D modeling workspace to create 3D objects.
2) Identify characteristics of rendering 3D objects for optimal system processing and analysis.
3) Create a 3D environment featuring lighting and textures.
4) Create basic 3D models and animations.
5) Evaluate digital 3D projects, identify items for improvement, and implement changes.

Chapter 1	**Introduction**	9 Hours

1. Animation Concepts
2. Step to create animation
3. Drawing Poses
4. Acting for animation

Chapter 2	**Animation I**	9 Hours

1. Using Joints and Constraints
2. Inverse Kinematics
3. Keyframe Animation
4. The Graph Editor
5. Play blast and FCheck
6. Driven Keys
7. Motion-Path Animation
8. Motion Trails
9. Animating Constraints
10. Animation Layers
11. Grease Pencil
12. Working with Deformers
13. Animating Facial Expressions Using Blend Shapes
14. Animating a Scene Using Nonlinear Deformers
15. Creating a Jiggle Effect
16. Optimizing Animations with the Geometry Cache
17. Applying Motion Capture

Chapter 2	**Animation !!**	9 Hours

1. Using Joints and Constraints
2. Inverse Kinematics
3. Keyframe Animation
4. The Graph Editor
5. Play blast and FCheck
6. Driven Keys
7. Motion-Path Animation
8. Motion Trails

9. Animating Constraints
10. Animation Layers
11. Grease Pencil
12. Working with Deformers
13. Animating Facial Expressions Using Blend Shapes
14. Animating a Scene Using Nonlinear Deformers
15. Creating a Jiggle Effect
16. Optimizing Animations with the Geometry Cache
17. Applying Motion Capture

Reference books

- Mastering Autodesk Maya 2016: Autodesk Official Press

3d Design - Dynamics

Objective

1. Provides an introduction to creating, editing, and analyzing 3D models. Develops foundational skills to work with, and navigate the digital 3D modeling workspace to create 3D objects. Examines basic elements of the 3D development of modeling, texturing, lighting, animating, and rendering.

Outcome

1. Work with and navigate the unique features of the digital 3D modeling workspace to create 3D objects.
2. Identify characteristics of rendering 3D objects for optimal system processing and analysis.
3. Create a 3D environment featuring lighting and textures.
4. Create basic 3D models and animations.
5. Evaluate digital 3D projects, identify items for improvement, and implement changes.

Chapter 1	**Introduction**	9 Hours

5. Introducing Dynamics
6. Basic Concept

Chapter 2	**nParticles**	9 Hours

1. Creating nParticles
2. Making nParticles Collide with nRigids
3. Using nParticles to Simulate Liquids
4. Emitting nParticles Using a Texture
5. Using Wind
6. Shading nParticles and Using Hardware Rendering to Create Flame Effects
7. Controlling nParticles with Fields
8. Rendering Particles with mental ray
9. The Bottom Line

10. Creating a Jiggle Effect
11. Optimizing Animations with the Geometry Cache
12. Applying Motion Capture

Chapter 2	**Dynamic Effects**	9 Hours

1. Creating nCloth Objects
2. Creating nCloth and nParticle Interactions
3. Soft Body Dynamics

4. Creating Flying Debris Using nParticle Instancing
5. Animating Instances Using nParticle Expressions
6. Bullet Physics.

Chapter 2	**Hair and Clothing**	9 Hours

1. Understanding XGen
2. Animating Using Dynamic Curves
3. Adding Hair to a Character
4. Styling Hair
5. Rendering Hair
6. Creating Clothing for Characters
7. Painting nCloth Properties

Chapter 2	**Maya Fluids**	9 Hours

1. Using Fluid Containers
2. Fluid Interactions
3. Igniting the Fuel
4. Rendering Fluid Containers
5. Creating Fluids and nParticle Interactions
6. Creating Water Effects

Reference books

- Mastering Autodesk Maya 2016: Autodesk Official Press

Course Type: Core Credit | Course Code: BVOC 127

Paper 3: 3d Design - Lights, Camera, Render

Teaching Scheme	No. of Credits	Examination Scheme
4 Hours / Week	4	IE: 50Marks UE: 50 Marks

Objective

1. Provides an introduction to creating, editing, and analyzing 3D models. Develops foundational skills to work with, and navigate the digital 3D modeling workspace to create 3D objects. Examines basic elements of the 3D development of modeling, texturing, lighting, animating, and rendering.

Outcome

1. Work with and navigate the unique features of the digital 3D modeling workspace to create 3D objects.
2. Identify characteristics of rendering 3D objects for optimal system processing and analysis.
3. Create a 3D environment featuring lighting and textures.
4. Create basic 3D models and animations.
5. Evaluate digital 3D projects, identify items for improvement, and implement changes.

Chapter 1	**Introduction to CGI Lighting**	9 Hours

1. Basics of Cinematic Lighting
2. Light Properties
3. Key to Fill Ratio
4. Establishing Emotion
5. Establishing Key
6. Working with Color
7. Character Lighting
8. Review of CG Light Sources
9. 3 Point Setup
10. Basic Maya Rigs
11. IPR

Chapter 2	**Direct Lighting Fundamentals**	9 Hours

1. Direct Lighting Technique
2. Direct Lighting Rigs
3. Light Linking
4. Lighting Interiors
5. Point Arrays
6. Shadow Mapping
7. Color Mapping
8. Incandescence Mapping

9. Shader Glow Blooms
10. OptiFX Review
11. Fogs, Glows, Flares
12. Lighting Exteriors
13. Environment Skies
14. HDR Cheats
15. Global Illumination Terms
16. Mental Ray Review
17. HDR Lighting
18. Physical Sky
19. Photon Mapping
20. Hemispherical Sampling
21. Caustics
22. Subsurface Scattering
23. Portal Light

Chapter 2	Texturing	9 Hours

1. Texturing Fundamentals
2. UV Mapping
3. 3D Texture Painting
4. Texture Nodes- 2D
5. Texture Nodes- 3D
6. Label Mapping
7. Projection Types
8. Animated Maps
9. Mipmaps
10. Mapping Fractal Noise
11. Ramp Texture
12. Layered Textures
13. Environment Textures

Chapter 2	Shaders	9 Hours

1. Basic Shader Review
2. Advanced Shader Review
3. Shader Networks
4. Data Types and Flow
5. Color Mult and Offset
6. Age and Weathering
7. Specular Mapping
8. Rendering Metals
9. Bump and Displacement Mapping
10. Rendering Glass
11. Use Background Shader
12. Utility Nodes
13. Facing Ratio
14. Surface Luminance
15. FX Animation w/ Shaders

Chapter 2	Camera	9 Hours

1. Basic Camera Attributes
2. Perspective Correction
3. Camera Animation Strategies

4. Curve Randomization
5. Shaker Node
6. Tracked Curves
7. Multi-Node Camera Setup
8. Motion Control Rigs
9. Camera Projection

Chapter 2	**Rendering**	9 Hours

1. Rendering by Layer
2. Z-Depth Rendering
3. OpenEXR Format
4. Depth of Field
5. Vector Motion Blur

Reference books

- Mastering Autodesk Maya 2016: Autodesk Official Press

Guidelines: **Practical's/Assessment/Presentations**

Practical's: Faculty has to take Daily practical of 1 hour each for 30 days.
Presentations: In class/Lab/projector-based presentations along with the submission of the PPT file.
Software Assignments: Student has to submit Master file along with the Jpg version of the same file (1920X1080).
For e.g. A *.**psd** File for **photoshop** assessment along with its **jpg.**
Images/Photography: All Image submission should be 1920X1080 for the respective subject. Photography and digital film making can have 4k or 4k+ resolution.
Videos: All video submission should be 1920X1080 for the respective subject.
Renders: All Rendered submissions should be 1920X1080 for the respective subject.
Naming conventions: File Naming should be in given format for all type of assignments.

College_Year_Studentname_subject_Assesmentname.Ext
E.g. APC_FYBvoc2021_VikasJadhav_Illustrator_LogoDesign.Jpg

Drawings: The Drawing assignments are to be submitted by the student in the form of a journal/file containing individual assignment sheets. Each assignment includes the Assignment Title, Problem statement, Date of submission, Assessment date, Assessment grade and instructor's sign.

BVOC 128	3d Design Assessment's	Paper- 4 Credits 6

3d Design – Modelling, Texturing

1. Assessment: 5 Prop Models
2. Assessment: 1 Organic model
3. Assessment: 1 set model
4. Assessment: 1 automobile model
5. Assessment: Shading and Texturing all above modeling assignments

3d Design - Rigging, Animation

6. Assessment: 1 rigged model
7. 1 path-based animation
8. 1 multiple objects along the path animation

3d Design – Dynamics

9. Assessment: Pouring water with n particles
10. Assessment: Sprite smoke with collision
11. Assessment: Ncloth on character walk cycle
12. Assessment: Soft body assignment 1
13. Assessment: Soft body assignment 2
14. Assessment: Bullet physics rigid body.

3d Design - Lights, Camera, Render

15. Assessment: Camera animation on set (Free move)
16. Assessment: Camera animation on set (on path)
17. Assessment: Lighting interior
18. Assessment: Lighting exterior. Day/night
19. Assessment: Light fog fx.
20. Assessment: Depth of field and motion blur assignments.

BVOC 117	Presentation on Concept of 3d	Paper- 5 Credits 6

Assessment 1: Create a PowerPoint presentation on concept of 3d and present it in class.		
BVOC 118	Hands on Training (Project – 3d Animation Film Making)	Paper- 6 Credits 6
Assessment 1: Create a 3d animation film on a given concept. (20 - 30 sec)		

Course Type: Core Credit Course Code: BVOC 146

Paper-1: Concept of Visual effects

Teaching Scheme	No. of Credits	Examination Scheme
4 Hours / Week	2.4	IE: 15 Marks UE: 35 Marks

Objective

1. To get acquainted with core concept and advance vfx preproduction.
2. Learn visual effects production pipeline and in depth look at visual effects and 3d integration pipeline.
3. Explore On set visual effects supervision while shooting live action.
4. Dive into post production process.
5. Be ready with what's now and what's upcoming. Get indulge with all modern technology that is uprising.

Outcome

1. Students will be able to understand the visual effects process at every stage and roles and responsibilities of individuals to create a successful visual effects film.
2. Students will be gaining access to technology required and the future of the technology to develop the process of visual effects.

Chapter 1	**Core Concepts**	2 Hours

1. Special Effects or Visual Effects?
2. What Does CGI Really Mean?
3. 2D, 3D, and Stereoscopic 3D
4. Realism and Photorealism
5. The Danger of Over-indulgence
6. Animation, Games, and Visual Effects
7. VFX and the Digital Revolution
8. Digital vs. Film
9. Film vs. Television

Chapter 2	**VFX as a Filmmaking Tool**	2 Hours

1. Common Types of VFX Shots
2. Fix-it Shots
3. Screen Inserts
4. Rig Removal and Period Cleanup
5. Set Extensions
6. Crowd Tiling/Crowd Simulation
7. Action Elements
8. Advanced VFX

Chapter 3	From 2D to 3D: The Quest for the Lost Dimension	2 Hours

1. Camera Movement and VFX
2. Parallax
3. Perspective Shift
4. 2D Workflow
5. The Missing Dimension
6. Recreating the Camera
7. 3D Workflow
8. 3D vs. 2D
9. 2.5D: The Hybrid Solution
10. Putting It All Together

Chapter 4	Separation: Roto, Green Screens, and the Challenges of Extraction	2 Hours

1. Rotoscoping
2. Green Screen
3. The Challenges of Extraction
4. Background Matching
5. Spill
6. Non-solid Edges

Chapter 5	The VFX Workflow: An In-depth Look at the Various Crafts of Visual Effects	2 Hours

1. Pre-production Crafts
2. Previs
3. Concept Art
4. Camera Tracking
5. Layout
6. Modeling
7. Technical Modeling
8. Organic Modeling
9. Cost-saving Alternatives
10. Texturing and Shading
11. Shaders
12. Textures
13. Rigging
14. Animation
15. Motion Capture
16. Lighting and Rendering
17. CG Lighting Essentials
18. Rendering
19. Compositing
20. Matte Painting
21. Dynamic Simulations
22. Rigid-body Simulations

23. Cloth Simulations
24. Fluid Simulations
25. Particle Systems
26. Crowd Simulation

Chapter 6	Workflow Case Studies	4 Hours

1. Shot 1: Background Cleanup
2. Shot 2: The Homestead Strike
3. Shot 3: Piranha Attack

4. Asset Work vs. Shot Work
5. Shot 4: Tsunami Mayhem

Chapter 7	Pre-production	2 Hours

1. Preliminary VFX Breakdown
2. The VFX Supervisor and VFX Producer
3. Model 1: Dedicated Production VFX Supervisor and Producer
4. Model 2: Company In-house VFX Supervisor and Producer
5. Preliminary Bidding
6. Inside the Bidding Process
7. Storyboarding
8. Previs and Concept Art
9. VFX Production Meetings
10. Tech Scouts
11. Detailed Budget and Schedule
12. Case Study: Ellis Island

Chapter 8	On Set	3 Hours

1. Shooting VFX Elements
2. Camera Movement
3. Camera Angle and Position
4. Lens Type
5. Framing
6. Choosing the Right Background
7. Frame Rate
8. Green Screens
9. Action Coverage
10. Screen Consistency
11. Cast Shadows
12. Tracking Markers
13. Smoke and Atmospherics
14. Reflections
15. Lighting Green Screens
16. Roto or Green Screen?
17. Case Study: The Crane Dare
18. On-set Data Acquisition
19. Camera Information
20. On-set Reference Photography
21. Spherical HDRI Light Domes
22. Lidar 3D Scanning
23. Photogrammetry
24. Crowd Tiling
25. Setting Up the Camera

26. Setting Up the Camera
27. Screen Inserts Setup
28. Stunts and Visual Effects
29. Special Effects and Visual Effects

Chapter 9	Post-production	3 Hours

1. The Post-production VFX Workflow
2. VFX Color Workflow
3. Image and Video Formats

4. Bit Depth
5. Compression
6. Optimal Quality Formats
7. Lower Quality Formats
8. Color Space Demystified
9. ACES Color Space
10. VFX and Editorial
11. The VFX Editor
12. When to Deliver Shots to the VFX Team
13. Handles
14. Edit Refs
15. Editorial Temps
16. Budgeting and Scheduling
17. Budget Updates
18. Change Orders
19. Scheduling
20. The Reviewing Process
21. Mockups
22. Style Frames
23. Play blasts
24. Turntables
25. Comp
26. Final Approval
27. Communication
28. Providing Feedback

Chapter 10	The Future	3 Hours

1. Light field Cinematography
2. Depth-based Separation
3. Per-frame Dense Point Clouds
4. Big Changes Ahead
5. Super-black Materials
6. Real-time Rendering
7. AR, MR, and VR

Reference books

- The Filmmaker's Guide to Visual Effects by Eran Dinur
- The Visual Effects Producer by Charles Finance, Susan Zwerman

Course Type: Core Credit | Course Code: BVOC 131

Paper-1: Introduction to Vfx, Roto and Paint

Teaching Scheme	No. of Credits	Examination Scheme
4 Hours / Week	4	IE: 50 Marks UE: 50 Marks

Objective

1. To create quality artist for matte extractions and paint and cleanup department. Create industry ready skillsets with greater eye for details and quality check attributes.

Outcome

1. Students will be able to understand how to draw and animate shapes with best use of animation blocking.
2. Working with different techniques required for paint and cleanup.
3. Can manage their work with deadlines and client requirements and notes.
4. Greater turnarounds with curies and issues generated into the shots.

Chapter 1	**Introduction to silhouette**	8Hours

1. Roto Tools
2. Keyboard Shortcuts
3. Creating Spline/Type
4. Editing Controls
5. Timeline Controls
6. Transformation (Object or Sub-Object)
7. Viewer Controls

Chapter 2	**origins of Roto**	8 Hours

1. Origins of Roto
2. Modern Roto

Chapter 3	**Pre-Shot Warm-Up**	8 Hours

1. Establish Specifics
2. Shot Length
3. Define the Focus Object
4. Matte Usage
5. Edge and Shape
6. Multiple Shapes
7. Repeating Shapes
8. Positive Space
9. Motion Paths
10. Keying
11. Review

Chapter 3	**Key Framing Techniques**	8 Hours

1. Timeline Key Framing

2. Bifurcation
3. Incremental Key Frames
4. Motion -Based Roto
5. Approaching the Shot

Chapter 4	Creating Splines, Edge Consistency, Transforms	8 Hours

24. Organizing the Comp
25. Transitioning Between Shapes
26. Transforming shapes

Chapter 5	Quality check shots	8 Hours

1. Multiple Transforms
2. Averaging Tracks
3. Stabilizing Footage
4. Quality check with all matte methods

Chapter 6	Roto and the Human Figure, Human Movement	8 Hours

1. Remember Your Anatomy
2. Isolating Extremities
3. Hands
4. Joints
5. Overlap
6. Fixer Shapes
7. Big Human Movements
8. Subtle Human Movement
9. Tracking and the Human Figure

Chapter 7	Hair, Clothing	8 Hours

1. Base Shapes
2. Standouts
3. Shape Breakdown
4. Consistent Point Placement
5. Secondary Motion
6. Minimum Level of Detail
7. Motion Paths and Motion Blur

Chapter 8	Keeping Focus and Getting Work	8 Hours

1. Bad Habits
2. Estimating a Job
3. Pacing Yourself
4. Getting (and Keeping) a Job

Chapter 9	Introduction to Nuke	8 Hours

1. Components of the Graphic User Interface
2. The Content menu
3. A rundown of the various panels
4. The menu bar
5. The contextual menu

6. Hot keys
7. Nodes
8. Creating a node
9. The Read node
10. The File Browser
11. The Viewer
12. Navigating the Viewer
13. Using the Viewer
14. Viewer inputs
15. Playing a clip in the Viewer

Chapter 10	**Working with Process Trees**	8 Hours

1. Creating a Simple Process Tree
2. Merging Images
3. Merging remultiplied images
4. Saving Nuke scripts
5. Inserting and Manipulating Nodes in the Tree
6. Inserting, creating, branching, and replacing nodes
7. Connecting nodes
8. Selecting nodes
9. Arranging nodes
10. Disabling and deleting nodes
11. Changing Properties
12. Color correcting the image
13. Using the Properties Bin
14. Adjusting properties, knobs, and sliders
15. Using the Color Wheel and Color Sliders panel
16. Using the Animation menu
17. Rendering
18. Using the Write node
19. Naming file sequences
20. Delving Deeper into the Merge Node
21. Using the Shuffle node
22. Viewing a composite without rendering
23. Creating Animation with Keyframes
24. Indicators on nodes
25. Rendering a new version and comparing
26. Comparing images

Chapter 11	**Paint**	8 Hours

1. Introducing RotoPaint's Interface
2. Painting strokes
3. Editing strokes
4. Painting in vectors
5. Erasing and deleting strokes
6. Drawing and editing shapes
7. Animating a shape
8. The Curve Editor
9. Painting in Practice
10. Using Paint for wire removal
11. Dust removal with Paint
12. Split-Screening Twins with Roto
13. Combining Paint, Roto, and Animation

14. Compositing with the Key Mix node
15. Working with the Stroke/Shape List window
16. Using the Dope Sheet

Chapter 12	**Nuke**	8 Hours

1. Components of the Graphic User Interface
2. The Content menu
3. A rundown of the various panels
4. The menu bar
5. The contextual menu
6. Hot keys
7. Nodes
8. Creating a node
9. The Read node
10. The File Browser
11. The Viewer
12. Navigating the Viewer
13. Using the Viewer
14. Viewer inputs
15. Playing a clip in the Viewer

Reference books

- Getting Started with Nuke

Course Type: Core Credit | Course Code: BVOC 132

Paper-2: Tracking and Matchmove and Rotomation

Teaching Scheme	**No. of Credits**	**Examination Scheme**
4 Hours / Week	4	IE: 50 Marks UE: 50 Marks

Objective

1. Understand camera motion in virtual 3D space and how to accurately model it to reconstruct a scene
2. Understanding of virtual 3D camera principles. know about filming techniques and lenses, including the principles of distortion, parallax and over scan
3. Be skilled at relevant tracking and 3D packages and compositing software
4. Eye for detail: be methodical and highly accurate in your work, paying closing attention to detail and have strong problem-solving skills

Outcome

1. Student will recreate live-action backgrounds (plates) on a computer in a way that mirrors the camera on the set in every way, including lens distortion. They do this by tracking the camera movements to make sure the real and virtual scenes appear from the same perspective.

Chapter 1	Introduction	9 Hours

1. Intro
2. Tracking
3. Matchmove
4. Rotomation

Chapter 2	Types of Matchmoves and Their Uses	9 Hours

1. What Does a Typical Matchmove Task Look Like in the First Place?
2. Planning
3. Gathering Data
4. Building Assets
5. Attacking the Shot
6. What the Computer Thinks About
7. What Kinds of Matchmove Tasks Are There?
8. What Kind of Matchmover Are You?

Chapter 3	What You Need to Know About It, and Why	9 Hours

1. Parts of the Film Camera and How They Work
2. Information Gathering On Set
3. Communication
4. Back at the Office: Information Integration
5. First Steps: Setting Up Your Scene.

Chapter 4	Common Sense and the Mystery Plate	9 Hours

1. You Know More Than You Think You Do
2. Where to Start?
3. The Web Is Your Friend
4. Google Maps
5. Google Earth
6. Building the Set
7. Creating the Camera
8. Lining Up the Shot

Chapter 5	You Have a Video Plate	9 Hours

1. It's a Brave New Digital World
2. What Makes Video Plates So Different?
3. What to Do?
4. And Now, the Results

Chapter 6	Camera Moves Considered	9 Hours

1. Lock off Shots
2. Pan and Tilt Shots
3. Dolly (Truck) and Tracking Shots
4. Crane Shots
5. Steadicam and Handheld Shots
6. Focus Pulls and Zooms

Chapter 7	**Real-Life Shot: Lockoff Camera**	9 Hours

1. Determine What Needs to Be Done
2. Review Your Information
3. Set Up Your Shot
4. Does It Make Sense?

Chapter 8	**Camera Moves Considered**	9 Hours

1. Lock off Shots
2. Pan and Tilt Shots
3. Dolly (Truck) and Tracking Shots
4. Crane Shots
5. Steadicam and Handheld Shots
6. Focus Pulls and Zooms

Chapter 9	**Real-Life Shot: Focus Pull**	9 Hours

1. Determine What Needs to Be Done
2. Review Your Information
3. Color-Correct Your Plates
4. Set Up the Scene
5. 2D Track
6. Survey Constraints
7. 3D Solve
8. Does It Make Sense?
9. Evaluation

Chapter 10	**Real-Life Shot: Camera Tilt**	9 Hours

1. Determine What Needs to Be Done
2. Review Your Information
3. Set Up Your Shot
4. 2D Track
5. Survey Constraints
6. 3D Solve

7. Handoff
8. Adding Guestimate Geometry
9. Evaluation

Chapter 11	**Real-Life Shot: Handheld Camera**	9 Hours

1. Determine What Needs to Be Done
2. Review the Information
3. Set Up the Shot
4. 2D Tracking

5. 3D Solve
6. Refining the Solution Channels
7. One-Point Solve

Chapter 12	Character Rotomation Considered	9 Hours

1. First Off: What's Roto for?
2. How Do You Start?
3. Great, I Got a Rig. And I'm Scared
4. Rotomation First Pass: Animating Large to Small
5. Rotamating Dos and Donts
6. Which Channels to Key and When to Key Them
7. Finding the Next Set of Keyframes
8. Set, Delete, Set

Chapter 13	Know Your Character Rig	9 Hours

1. Embrace Your Inner Rotomator
2. Getting to Know You
3. Let's Meet Our Rig
4. Control: Master (World)
5. Control: Body
6. Control: COG (Center of Gravity)
7. Control: Hips
8. Control: Spine
9. Control: Neck
10. Control: Head
11. Control: Shoulders
12. Control: Arms
13. Control: Elbow
14. Control: Legs
15. Control: Leg, Pivot, and Roll
16. Control: Knees
17. Control: Fingers
18. You're Almost Ready to Start
19. Next Up

Chapter 14	Real-Life Shot: Character and Object Rotomation	9 Hours

1. Determine What Needs to Be Done
2. Part 1: Character Rotomation
3. Breaking Down the Clip
4. Hip Close Up
5. First-Pass Rotomation: Walking
6. First-Pass Rotomation: Sitting
7. Second-Pass Rotomation

8. Shot Part 2: Cup Rotomation
9. Constraining the Prop Cup
10. Animating Constraints On and Off
11. Animating the Cup Trajectory
12. Keeping Track of Cylindrical Spinning
13. First Pass Over the Pool
14. Finishing UpSet, Delete, Set

Reference books

- The invisible art of camera by Wiley
- The Art and Technique of Match moving by Erica Hornung

Course Type: Core Credit | Course Code: BVOC 133

Paper-3: Green screen And Matte Paint and Compositing

Teaching Scheme	No. of Credits	Examination Scheme
4 Hours / Week	4	IE: 50 Marks UE: 50 Marks

Objective

1. understand the principles of composition, and creating detailed thumbnail sketches. You'll then learn to take your sketches and build upon them with basic photo bashing techniques to give quick life to your first matte painting.
2. Create perfect mattes from green/blue screen footage.

Outcome

1. integrating photos from different sources into a single piece, and how to give them a consistent look and feel.
2. Use advanced Photoshop techniques to achieve seamless color, atmosphere, and lighting effects to finish your matte painting.
3. To use multiple keying approaches that will prepare you for any shot, and the various challenges that inevitably arise. to
4. Fix problems, such as preserving hair detail and removing color spill from process screens. Color spill is almost always a problem and dealing with it is one of the most important aspects of integrating your process screen elements into a shot.

Chapter 1	Introduction	4 Hours

1. Introduction to Keying
2. Breaking downs parts
3. In matte out mattes
4. Spill, Edge refinements
5. Alpha

Chapter 2	Keying	9 Hours

1. Introducing Nuke's Keying Nodes
2. HueKeyer
3. The IBK: Image Based Keyer

4. Keylight
5. Combining Keyer Nodes Using the Tree
6. Erode, Dilate, and Erode
7. Spill suppressing with HueCorrect

Chapter 2	**Grading**	5 Hours

1. Understanding Nuke's Approach to Color
2. Color Manipulation Building Blocks
3. Dynamic range
4. Using an I/O Graph to Visualize Color Operations
5. Creating Curves with ColorLookup
6. Color Matching with the Grade Node
7. Using the Grade node
8. Using CurveTool to match black and white points
9. Matching midtones by eye
10. Achieving a "Look" with the ColorCorrect Node
11. Using the ColorCorrect node
12. Using the mask input to color correct a portion of the image

Chapter 2	**Matte paint**	9 Hours

16. Creating concept with photoshop
17. Working with live action
18. Working completely from scratch
19. Collecting asset
20. Resolutions and technical requirements
21. Concept approvals
22. Refining
23. Color correction
24. Channel compositing
25. Atmospheric elements
26. finalizing

Chapter 2	**Camera Projection**	9 Hours

1. Camera Projection
2. Building a Camera Projection Scene
3. Tweaking the Geometry
4. Animating the Camera
5. Tweaking the Texture
6. Using a Spherical Transform to Replace Sky
7. Compositing Outside the Scanline Render Node
8. Cloning nodes
9. Final adjustments
10. D Compositing Inside D Scenes
11. Importing Photoshop layers
12. Creating the frame
13. Compositing the screen into the D scene
14. Rendering the Scene

Reference books

- Getting Started with Nuke
- Nuke 101

Paper-5: Compositing

Objective

1. To create the final image of a frame, shot or VFX sequence. They take all the different digital materials used (assets), such as computer-generated (CG) images, live action footage and matte paintings, and combine them to appear as one cohesive image and shot.

Outcome

2. Consider visual aspects of a scene.
3. They relight in order to improve the look of the image
4. Learn to makes an image appear realistic in terms of light, color, composition and perspective
5. Understand cameras, cinematography and how films colors.

Chapter 1	**The Composite**	9 Hours

1. Premultiply vs Unpremultiply
2. Premultiply
3. Unpremultiply
4. The Double Premultiply
5. The Composite
6. The Over Composite
7. The KeyMix Composite
8. The AddMix Composite
9. How It Works
10. How to Build It
11. How to Use It
12. The Processed Foreground Method
13. The Workflow
14. What to Watch Out For
15. Compositing With a Keyer

16. Soft Comp/Hard Comp
17. “Cut and Paste” Keyer Compositing
18. Compositing Outside the Keyer
19. The Single Key
20. The Uberkey
21. Soft Key/Hard Key
22. The Additive Keyer
23. Stereo Compositing
24. Anaglyph
25. Stereopsis
26. Stereoscopy
27. The Stereo Conversion Process
28. Depth Grading
29. Scene Transition

30. The Dashboard Effect
31. Window Violation
32. Miniaturization
33. Divergence
34. Stereo Compositing
35. Dual View Display
36. Split and Join Views
37. Disparity Maps

Chapter 2	Compositing CGI	9 Hours

1. Multi-pass CGI Compositing
2. Process Verification for Your Renderer
3. Render Passes
4. Lighting Passes
5. Render Passes Workflow
6. Beauty Pass Workflow
7. AOVs
8. ID Passes
9. Normals Relighting
10. EXR File Format
11. Film Scans
12. Linear Lightspace
13. Arbitrary Image Channels
14. HDR Images
15. Deep Compositing
16. Deep Images
17. The Layering Complexity Problem
18. The Depth Compositing Edge Problem
19. The Re-rendering Problem
20. Deep Compositing with Live Action

Chapter 3	D Compositing	9 Hours

1. A Short Course in D
2. The D Coordinate System
3. Vertices
4. Meshes
5. Surface Normals
6. UV Coordinates
7. Map Projection
8. UV Projection

9. D Geometry
10. Geometric Transformations
11. Geometric Deformations
12. Image Displacement
13. Noise Displacement
14. Deformation Lattice
15. Point Clouds
16. Lights
17. Shaders
18. Reflection Mapping
19. Ray Tracing
20. Image-based Lighting
21. Cameras
22. D Compositing

Chapter 4	Sweetening the Comp	9 Hours

1. Layer Integration
2. Interactive Lighting
3. Edge Blending
4. Light Wrap
5. Creating Shadows
6. Edge Characteristics
7. Density
8. Color
9. Faux Shadows
10. Shadow Warping
11. Contact Shadows
12. Atmospheric Haze
13. Adding a Glow
14. Grain Management
15. Grain Characteristics
16. Regraining Techniques
17. Regrain Tool
18. Lifted Grain
19. Grain Rescue
20. Grain Management Workflows
21. Live Over Live
22. Live Over CGI
23. CGI Over Live
24. CGI Over CGI
25. Still Photos
26. Managing Clipping

Chapter 5	Camera Effects	9 Hours

1. Lens Effects
2. Lens Distortion
3. Depth of Field
4. Vignetting
5. Lens Defects
6. Spherical Aberration
7. Astigmatism
8. Chromatic Aberration
9. Glows and Flares
10. Lens Flare
11. Lens Filter Flare

12. Diffraction Glows
13. Veiling Glare
14. Grain
15. Lens Distortion Workflows
16. CGI Over Live Action
17. Live Action Over CGI
18. CGI Over CGI
19. Live Action Over Live Action
20. Matching the Focus
21. Using a Blur for Defocus
22. How to Simulate a Defocus
23. Sharpening
24. Sharpening Operations
25. Unsharp Masks

26. Making Your Own Unsharp Mask
27. Rolling Shutter
28. PART III THINGS YOU SHOULD KNOW
29. Chapter – Digital Color
30. Color Spaces
31. Primary Chromaticities
32. Units of Measure
33. Transfer Function
34. Gamut
35. HSV and HSL
36. Log and Linear
37. Working in Linear
38. What Exactly Is Linear?
39. Color Operations
40. Transformations and Filtering
41. CGI
42. Metadata
43. OpenColorIO
44. ACES Color Management
45. The ACES Workflow
46. The ACES Gamut
47. What About Video Productions?

Chapter 6	**Image Blending**	9 Hours

1. Image Blending in Linear Light Space
2. Image-blending Operations
3. Compositing Operations
4. Matching the Look of sRGB in Linear
5. All sRGB Color Space
6. sRGB Within Linear
7. Alpha Compositing Operations
8. Image-blending Operations
9. The Screen Operation
10. Adjusting the Appearance
11. The Weighted Screen Operation
12. Multiply
13. Adjusting the Appearance
14. Maximum
15. Minimum
16. Absolute Difference
17. Adobe Photoshop Blending Modes
18. Simple Blending Modes

19. Complex Blending Modes
20. Slot Gags
21. Retiming Clips
22. Constant Speed Changes
23. Variable Speed Changes
24. Interpolation Methods
25. Nearest Neighbor
26. Frame Average
27. Motion Estimation
28. VR Stitching
29. Workflow Overview
30. Removing Lens Distortion
31. Building a Matching Computer Rig
32. Projecting Onto the Panosphere

33. The Stitching Process
34. Coping with Parallax
35. Exposure Correction
36. Visual Effects

Chapter 4	Sweetening the Comp	9 Hours

1. Layer Integration
2. Interactive Lighting
3. Edge Blending
4. Light Wrap
5. Creating Shadows
6. Edge Characteristics
7. Density
8. Color
9. Faux Shadows
10. Shadow Warping
11. Contact Shadows
12. Atmospheric Haze
13. Adding a Glow
14. Grain Management
15. Grain Characteristics
16. Regraining Techniques
17. Regrain Tool
18. Lifted Grain
19. Grain Rescue
20. Grain Management Workflows
21. Live Over Live
22. Live Over CGI
23. CGI Over Live
24. CGI Over CGI
25. Still Photos
26. Managing Clipping

Reference books

- Digital Compositing for Film and Video, 4th Edition

Guidelines: **Practical's/Assessment/Presentations**

Practical's: Faculty has to take Daily practical of 1 hour each for 30 days.
Presentations: In class/Lab/projector-based presentations along with the submission of the PPT file.
Software Assignments: Student has to submit Master file along with the Jpg version of the same file (1920X1080).
For e.g. A *.**psd** File for **photoshop** assessment along with its **jpg.**
Images/Photography: All Image submission should be 1920X1080 for the respective subject. Photography and digital film making can have 4k or 4k+ resolution.
Videos: All video submission should be 1920X1080 for the respective subject.
Renders: All Rendered submissions should be 1920X1080 for the respective subject.
Naming conventions: File Naming should be in given format for all type of assignments.

College_Year_Studentname_subject_Assesmentname.Ext
E.g. APC_FYBvoc2021_VikasJadhav_Illustrator_LogoDesign.Jpg

Drawings: The Drawing assignments are to be submitted by the student in the form of a journal/file containing individual assignment sheets. Each assignment includes the Assignment Title, Problem statement, Date of submission, Assessment date, Assessment grade and instructor's sign.

BVOC 134	Visual FX Assessment	Paper- 4 Credits 6

Roto Paint
Assessment 1: Basic roto with props **(Boris Fx silhouette)**
Assessment 2: Roto with human Body
Assessment 3: Roto with Motion Blur
Assessment 4: Roto with Hairs
Assessment 5: Roto with Cloth
Assessment 6: Merge Operations **Nuke**
Assessment 7: Silhouette to nuke roto export
Assessment 8: Clean plate with 2d Track
Assessment 9: Clean plate with Projection
Assessment 10: Sequence paint Manual

Tracking, Matchmove and Rotomation
Assessment 1: Tracking with tripod and match move in Maya
Assessment 1: Tracking with Free move and match move
Assessment 1: Tracking with Undistort and match move
Assessment 1: Camera+Object track and match move
Assessment 1: Camera+Bodytrack and match move

Greenscreen, Matte painting
Assessment 1: Greenscreen 1
Assessment 1: Greenscreen 2
Assessment 1: Greenscreen 3
Assessment 1: Matte paint with Photoshop
Assessment 1: Projection of 2d+3d matte paint in nuke

Compositing
Assessment 1: 2d Element Compositing
Assessment 1: 2d3d Element Compositing with passes
Assessment 1: Green screen composite in nuke
Assessment 1: matte paint composite in nuke

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BVOC 135	Green Screen Shoot Outdoor/indoor Practical	Paper- 5 Credits 6
Assessment 1: An Outdoor/indoor Shoot for 5 different Themes Create a PowerPoint presentation on visual Fx Production pipeline		
BVOC 136	Hands on Training (Project – VFX Film Making)	Paper- 6 Credits 6
Assessment 1: Create a short visual effect film on a given concept.		