ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

MINOR

Subject: ANIMATION

w.e.f. AY 2023-24

COURSE STRUCTURE

Semester	Course Number	Course Name	No. of Hrs/Week	No. of Credits
Semester-II	1	Basic Drawing	3	3
		Basic Drawing Lab	2	1
Semester-III	2	2D Animation	3	3
		2D Animation Lab	2	1
Semester-IV	3	Introduction to 3D	3	3
		Introduction to 3D Lab	2	1
	4	Compositing - I	3	3
		Compositing - I Lab	2	1
Semester-V	5	Advanced 3D	3	3
		Advanced 3D Lab	2	1
	6	Compositing - II	3	3
		Compositing - II Lab	2	1

COURSE 1: BASIC DRAWING

Theory   Credits: 3   3 hrs/week

I. Course Objectives:

- Develop foundational drawing skills: The course aims to help students develop a solid foundation in drawing by teaching them fundamental techniques such as line work, shading, perspective, proportion, and composition.

- Enhance observation and perception skills: Through various exercises and activities, the course seeks to improve students' ability to observe and perceive details, shapes, forms, and textures in their surroundings.

- Learn and practice light and shadow techniques: Students will learn how to effectively use shading techniques to create depth, volume, and realistic forms in their drawings.

- Explore different drawing mediums: The course may introduce students to a range of drawing mediums such as graphite, charcoal, ink, and colored pencils.

- Develop perspective drawing skills: Students will learn the principles of perspective drawing, including one-point, two-point, and three-point perspective.

II. Learning Outcomes

Students at the successful completion of the course will be able to:

- Students will acquire a solid understanding of fundamental drawing techniques, including line work, shading, perspective, proportion, and composition.

- Students will develop their ability to observe and analyze their surroundings, paying attention to details, shapes, forms, and textures.

- Students will develop a strong understanding of how light interacts with objects and how to represent it in their drawings.

- Students will grasp the principles of perspective drawing and be able to create drawings that accurately represent three-dimensional space.

- Students will explore their creative potential and develop their unique artistic style.

III. Syllabus:

Unit - I: Sketching Materials: Gather essential sketching materials such as pencils (varying in hardness), erasers, sketching paper, and a sharpener. Experiment with different types of pencils to understand their range of values and textures.

Unit - II: Drawing Exercises and Prompts: Engage in regular drawing exercises and prompts to improve your skills and creativity. These can include timed sketches, drawing from memory, drawing using limited lines, or experimenting with different styles and techniques.

Unit - III: Lines and Contour Drawing: Learn about different types of lines and how to control their weight and direction. Practice contour drawing by observing objects or subjects and following their outlines with your eyes and pencil, without looking at your paper.

Unit - IV: **Perspective**: Study the fundamentals of perspective drawing to understand how objects appear in three-dimensional space. Learn about one-point, two-point, and three-point perspective and practice drawing simple objects and scenes using these principles.

Unit - V: Light and Shadow: Explore the concepts of light and shadow in drawing. Learn about different lighting techniques, shading, and rendering to create depth and dimension in your drawings. Practice observing how light falls on objects and replicate those effects in your sketches.

IV. References:

1. Drawing on the Right Side of the Brain" by Betty Edwards - This book is a classic resource for beginners, focusing on teaching the fundamental skills of drawing, perception, and artistic expression

2. Keys to Drawing" by Bert Dodson - This book covers a range of drawing techniques and exercises to help students develop their skills in line drawing, shape, shading, and composition.

3. Drawing for the Absolute and Utter Beginner" by Claire Watson Garcia - A beginner-friendly guide that provides step-by-step instructions and exercises to help aspiring artists gain confidence in their drawing abilities.

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:

1. Art Club: Start an art club at your school or join an existing one. This can be a platform for students to come together, share their drawings, collaborate on art projects, participate in group exhibitions, and organize art-related events or workshops.

2. Drawing Workshops: Organize or participate in drawing workshops conducted by professional artists or art educators.
3. Competitions and Exhibitions: Encourage students to participate in drawing competitions or art exhibitions. This can be at the school level, local art festivals, or regional/national events.

4. Art Contests and Challenges: Engage students in online art contests or drawing challenges that focus on specific themes or techniques.

5. Sketching Outings: Organize sketching outings to local parks, museums, historical sites, or nature reserves. This allows students to practice drawing from observation, explore different subjects, and engage with their surroundings. It also encourages a sense of community among fellow artists.

b) Suggested Co-Curricular Activities:

1. Training of students by a related field expert

2. Group discussions, Quiz, Debates, etc

3. Preparation of videos and PPT for the subject related presentations

4. Collection of material on the topics

5. Invited lectures and presentations on related topics

Practical   Credits: 1   2 hrs/week

VI. List of Experiments:

1. Materials: Gather the necessary drawing materials, such as pencils, erasers, drawing paper, and any additional preferred mediums (e.g., charcoal, ink, colored pencils).

2. Warm-up Exercise: Start with a warm-up exercise to loosen up your hand and practice drawing different types of lines. Experiment with straight lines, curved lines, dashed lines, thick lines, thin lines, and any other variations you can think of. Fill a page or two with these line exercises.

3. Line Study: Choose an object or scene with interesting shapes and contours. Using light pencil strokes, create an outline of the object, focusing on the various lines and contours that define its form. Pay attention to the direction and weight of the lines, as well as the negative spaces created by the object.

4. Shape Exploration: Select a few everyday objects around you (e.g., a mug, a book, a fruit). Instead of drawing detailed outlines, focus on capturing the basic shapes that make up the objects. Start by identifying the basic geometric shapes (circles, squares, triangles) and then add more complex shapes as needed.

5. Still Life Drawing: Set up a simple still life arrangement using objects of your choice. Arrange them in an interesting composition with varying shapes and sizes. Using your preferred drawing medium, create a detailed drawing of the still life, paying attention to the shapes, proportions, and relationships between the objects.

COURSE 2: 2D ANIMATION

| Theory | Credits: 3 | 3 hrs/week |

I. Course Objectives:

- Introduction to 2D Animation: Provide an overview of the history, principles, and techniques of 2D animation, including keyframe animation, tweening, and frame-by-frame animation.
- Animation Principles and Techniques: Teach students the fundamental principles of animation, including timing, spacing, anticipation, follow-through, and exaggeration.
- Storytelling and Narrative: Explore the art of storytelling through animation. Teach students how to develop storyboards, create engaging narratives, and effectively communicate emotions and ideas through their animations.
- Build a Strong Portfolio: Create a diverse and high-quality portfolio that showcases your range of skills and abilities. Include various animation styles and demonstrate your storytelling capabilities.
- Industry Awareness and Professional Development: Familiarize students with the current trends, practices, and career opportunities in the animation industry.

II. Learning Outcomes

Students at the successful completion of the course will be able to:

- Understanding of Animation Principles
- Proficiency in Animation Software
- Storytelling and Narrative Skills
- Character Design and Animation
- How to develop storyboards

III. Syllabus:

UNIT I: What is Animation- History of Animation (late 19th – early 20th century), Mid-20th century Animation, Golden Age of Animation, Digital Age and CGI Dominance, about traditional animation, Animation devices: phenakistoscope, Zoetrope, thaumatrope, Praxinoscope, flip book.

UNIT II: Adobe Animate: Interface and Workspace, panels, tools, and timelines, Drawing and Vector Art, Tools: Selection, Free Transform Tool, Brush Tool, Pencil Tool, Paint Bucket Tool, Text Tool, Bone Tool, Shape Tools, Deco Tool, 3D Transformation Tools, Bone and IK Tools, Layers, types of layers, frames, types of frames, time line bar, Onion Skin – FPS

UNIT III: Symbols, Graphics, Movie Clip & Button, Tweening, Types of Tweens, Object & Merge Drawings, Gradient Color, Color Effects, Filters, Shape Tween, Shape Hint Tween, About Mask, Layer Mask, Motion guide, Ease in and Ease out Animation, Working Frame - by - Frame Animations,Working on Tween Animation.

UNIT IV: Character creation: Character Model, Rigging, hierarchy of symbols, attaching bones and joints, Walk Cycle Animation, Facial Expressions and Lip Syncing, symbols or frame-by-frame animation to create realistic facial movements, synchronize the character's mouth with dialogue or sound.

 UNIT V: Creating Background Scenes, Reference and Conceptualization, Layering and Depth, Drawing and Painting Tools, Gradients and Shadows, Atmospheric Effects, Camera Movement, Idle and Secondary Animations, Adding Audio to Scene, Publish Movie, Publish Setting.

IV. References:

1. The Art of Stop motion animation: Ken A Priebe
2. Stop motion: Craft skills for model Animation: Susannah Shaw
3. Stop motion: Passion, Process and Performance: Barry JC Purves
4. Creating 3D Animation - The Aardaman Book of Film making: Peter Lord & Brian Sibley
5. Stop motion Armature Machining - A Construction Manual: Tom Brierton
6. A Century of Stop Motion Animation from Melies to Aardaman: Ray Harry Hausen
7. Stop motion Filming and Performance: Tom Brierton
8. Stop motion Puppet Sculpting: Tom Brierton

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:

- Follow the given assignments

- Study tour for getting professional practice in industry-standard Stop Motion

- Students will give seminar on Oral presentation of the Stop Motion animation

- Conducting quiz program on the Stop Motion Animation

- Group Discussions on Stop Motion Animation

b) Suggested Co-Curricular Activities:

- Follow the given assignments
- Study tour for getting professional practice in industry-standard Stop Motion
- Students will give seminar on Oral presentation of the Stop Motion animation
- Conducting quiz program on the Stop Motion Animation
- Group Discussions on Stop Motion Animation

Practical   Credits: 1   2 hrs/week

 VI. List of Experiments:

1. Domain specific quiz

2. Practical production work on Stop Motion animation

3. Presentations on outputs

4. Character Walk Cycle.

COURSE 3: INTRODUCTION TO 3D

Theory   Credits: 3   3 hrs/week

I. Course Objectives:

- Understand the virtual 3D space and how to build objects
- Create objects using primitive shapes and sub patch geometry
- Analyse the importance of file backup and management(projects setup)
- Evaluate the projects and assignments developed/prepared by the students

II. Learning Outcomes

Students at the successful completion of the course will be able to:

- Equip with the basic knowledge of Autodesk Maya
- Getting sufficient knowledge for doing simple 3D project
- Develop the skill of overall 3D workflow
- Understanding the use of lights
- Learn how to render 3D objects

III. Syllabus:

UNIT I: Introduction on Modelling , Fundamentals of modelling, Introduction to the interface of Maya, Menu set, Main Menu Bar, Panel Menu, The Channel Box and Layer Editor, Shelf, Creating New Shelf , Hotkeys, Viewport, Attribute Editor, Hot Box, Setting and Preferences, New, Set Project, modelling by basic geometrical primitives, Duplicating objects , Outline.

UNIT II: Import Images**,** viewport references, Model using Reference images, basic posture, Props Modelling, NURBS, CV, EP, Bezier, Pencil Curve tools, Mesh Conversion, Polygon to Nurbs,   Nurbs to polygon, High poly, Low Poly, Difference between hi- poly & low-poly characters.

UNIT III: Explanation of Material Editor and Applying Materials, Introduction to basic material types & Procedurals, Study of concepts: Opacity, Transparency, Secularity and colour, Working with Transparency, Reflection & Refraction, Bump & Displacement Maps, Explanation of Textures and UVW Mapping. Texture mapping, Wrapping of texture on a 2D surface.

UNIT IV: Lighting, Working with Arnold Lights 1-Point, Direct, Spot, Working with Maya Lights 2-Ambient, Area and Volume, Direct Illumination and Illuminating a Stage Show, Three Point Lighting and Exterior Lighting, Cast shadows, decay rate, Previewing lighting and shadows creating depth map Shadow, creating ray-traced

UNIT V: Concept of a lighting system and shadows, Creating area light shadows, setting area light visibility, Creating soft shadows with spotlights, rendering an AVI, Rendering an image sequence. Render layers: introduction, creating, Applying to render layer presets, setting overrides, creating render layer composites, Render Passes: Introduction, compare render passes and render layers, Render quality: anti-aliasing, setting colour profiles, diagnosing ray tracing.

IV. References:

- Peter Ratner-3D Human Modelling and Animation
- 3D Modelling and Printing with Tinkercad: Create and Print - Book by James FloydKelly
- Integrating 3D Modelling, Photogrammetry - Book by David Halbstein and Shaun Foster
- D Automotive Modelling: An Insider's Guide to 3D Car - Book by Andrew Gahan

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:
- Presentation on Modeling, Texturing Rendering, and popular work flow
- Demonstrate or Exhibit(museum) developed projects
- Group discussion on 2D, & 3D objects
- Study tour or Visit to production house to get knowledge on the 3D pipeline
- Exhibit on the external and internal models with a team project

b) Suggested Co-Curricular Activities:

- Written assignment
- Self-directed study with peers and tutors
- Evidence of process and experimentation in response of animation

COURSE 3: INTRODUCTION TO 3D

Practical   Credits: 1   2 hrs/week

V. List of Experiments:

- Create any Model some objects such as chairs, tables, fruits, utensils

- Create any Model instruments, tools

- Apply basic material and shader types & Procedurals textures.

- Unwrap the models of objects and characters using various projection maps.

- Apply texture on various objects and characters.

- Create Opacity, Smoothness, Secularity, and color maps, Transparency, Reflection

- Bump & Displacement Maps

- Render a frame and video of indoor and outdoor scenes.

- Render a video of indoor scenes.

COURSE 4: COMPOSITING - I

Theory   Credits: 3   3 hrs/week

VI. Course Objectives:

- Understand the fundamental concepts of compositing and its role in visual effects and motion graphics.
- Navigate and utilize the After Effects interface effectively.
- Import and organize footage, create compositions, and set up project settings for compositing.
- Apply various masking techniques to isolate and manipulate objects within a composition.
- Track and matchmove objects using After Effects' built-in tracking tools

VII.   Learning Outcomes

Students at the successful completion of the course will be able to:

- Analyze and awareness of computer graphics software
- Understand and recognize the different techniques in the VFX
- Create a drawing using motion graphics techniques
- Evaluate the own assignment
- Demonstrate the assignments

VIII.   Syllabus:

UNIT I: Introduction to layer-based software – Workspace and panels – Timeline panel – Working with composition settings – Importing and interpreting video and audio – Frame rate – Pixel aspect ratio and frame aspect ratio – Preparing and importing – Layers and properties – Selecting and arranging layers – Null object layers – 3D layer

UNIT II: Cameras – Lights – Points of interest – Animation and keyframes - Keyframe interpolation – Controlling speed – Animating with puppet tools – Time stretching and time remapping – Paint tools: Brush, Clone Stamp, and Eraser – Shapes and Mask

UNIT III: Creating Text – Editing text layers – Animating text - Alpha channels – Masks – Mattes – Keying – Roto Brush - Refine matte – Motion graphics – Blur – Sharpen – Channel effects

UNIT IV: Color Correction effects – Time remapping – 3D Camera tracking – Transparency – Compositing - Effects – 4-Color gradient effects – fill effects – Fractal effect – Ramp effects – paint bucket effects – Lens flare effect – Vegas effects – write-on effect – Drop shadow effects – Shatter effects – cc effects

UNIT V: Rig removal - Morphing - XMP metadata – Expression basics – Transition – Compositions – Tracking and stabilizing – Audio effects – Audio transition – Rendering and exporting – Exporting still images – Exporting Image sequences

IX. References:

- The Art and Science of Digital Compositing Book by Ron Brinkmann
- Compositing Visual Effects: Essentials for the Aspiring Artist Book by Steve Wright
- Digital Compositing in Depth! Book by Doug Kelly
- Adobe After Effects CS6 Classroom in a Book by Adobe Creative Team (Author)

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:
- Workshop/Seminar on motion graphics
- Work on the given assignments
- The individual shooting of your original footage for the demo reel
- Visit the Chroma studio to shoot green/blue screen footage
- RVJ (Reflective Visual Journal) on the theory and particles

b) Suggested Co-Curricular Activities:

- Oral presentations
- Self-reflective blogs
- Practical production works
- Peers and self –assessment for output
- Invited lectures and presentations on related topics

COURSE 4: COMPOSITING - I

Practical   Credits: 1   2 hrs/week

X. List of Experiments:

- Rotoscopy
- Keying (Green/Blue screen shooting and compositing
- Color Correction
- Tracking and Stabilizing
- Day to Night convert
- Wire or Rig Removals
- Motion poster design
- Title animation with write on
- Info-graphic and Motion graphic using with the effects

SEMESTER-V

COURSE 5: ADVANCED 3D

Theory   Credits: 3   3 hrs/week

I. Course Objectives:

- Understand the origins of 3D Animation practice
- Learn fundamental principles of 3D animation
- Analyse the development in the 3D production
- Create the Artefacts appropriate for each stage of the pipeline

II. Learning Outcomes

Students at the successful completion of the course will be able to:

- Students at the successful completion of the course will be able to:
- Hands-on experience on the processes
- Tools
- Techniques
- stages of production inherent in the 3D industry

III. Syllabus:

UNIT I: Introduction to bone system/Joints and IK handles - Creating bone system and maintaining naming conventions - Skinning types - Import and export of skin weights - IK and FK basics - IK and FK switch - Introduction to Deformers - Introduction to constrains and implementation to rig - Maintaining proper hierarchy - Grouping and creating controls - Rigging the characters - Use of deformers in the rigging process.

UNIT II: Brief about animation principles - Animation tools in 3D - Applying classical 2D animation techniques - Stretch squash for the 3D character - Creating the illusion of weight - Overview of Maya - Playback controls and Exploring Maya animation preferences - Details about graph editor - Bouncing Ball Exercise - Body language - Animating object along a motion path - Utilizing the tracks-editor to blend animation clips - Controlling attributes with set driven keys - Animating with constraints.

UNIT III: Key framing – Graph editor – Set the beginning and ending keys – Keys to make a ball bounce – Speed up the animation – Tune the animation curve – Set driven key – Playback range and create the objects – Examine the driven key – Path animation – Raise the train above the path – Trax Editor – Character set – Motion with a new clip

UNIT IV: Previewing animations in real-time with play blasts, Introduction to scene animation and key framing, dope sheet. Animal walk& run cycles, snakes, and birds. Biped Character walk cycles, Biped Character run cycles, pushing and pulling objects. Facial animation and lip-sync. Nonlinear Animation with Trax editor. Working with character sets and clips. character interactions.

UNIT V: Rendering Overview, what is rendering, How Maya renders Shader Networks, Shading Groups, Materials, Lights, Maya architecture, Nodes and Attributes, Hyper graph, IPR (Interactive Photorealistic Rendering), V-Ray techniques.

IV. References:

- Character Emotion in 2D and 3D Animation Book by Les Pardew
- Introducing Character Animation with Blender Book by Tony Mullen
- Mastering 3D Animation Book by Peter Ratner
- The Art of 3D Computer Animation and Effects Book by Isaac Victor Kerlow
- 3D Animation Essentials Book by Andy Beane

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:
- Follow the given assignments
- Study tour for getting professional practice in industry-standard 3D Softwares
- Students will give seminar on Oral presentation of the animation
- Conducting quiz program on the 3D
- Group discussions on 3D Pipeline

 b) Suggested Co-Curricular Activities:

- Domain specific quiz
- Practical production work on 3D portfolio
- Oral presentations on outputs

COURSE 5: ADVANCED 3D

Practical   Credits: 1   2 hrs/week

VI. List of Experiments:
- Character Acting

- Creature Animation

- Lip Sync and Dialogue

- Advanced Rigging

- Physical-Based Animation

COURSE 6: COMPOSITING - II

Theory   Credits: 3   3 hrs/week

I. Course Objectives:

- Explore advanced compositing techniques such as multi-layer blending, masking, and integration of complex elements into a scene.
- Learn the art of digital matte painting to create realistic and detailed backgrounds for composites.
- Master the techniques of working with green screen footage and rotoscoping to seamlessly integrate subjects into various backgrounds.
- Dive deeper into masking and selection tools, including channel-based selections, advanced edge refinement, and precise control over complex subjects.
- Learn how to integrate 3D elements into 2D composites, including matching lighting, shadows, and perspectives for a cohesive final image.

II. Learning Outcomes

Students at the successful completion of the course will be able to:

- Analyze various techniques for realistic effects
- Create and Recognize the different techniques in the VFX
- Understand the shooting techniques in visual effects sequences
- Apply the filters and effects to get photorealistic
- Acquire a high level of expertise in advanced compositing techniques, allowing you to create visually stunning and seamless composites.

III. Syllabus:

UNIT I:
Introduction to the interface – Introduction to the flow editor – Working with polylines – Working with effect masks – working with motion paths – Working with grid warp deformations – particles – 3D interface – working with auxiliary channels – Stereoscopic and optical flow - Previews and Final renders.

UNIT II:
Induction to node software – Understanding the workflow – Toolbar – Menu bar – Properties panels – Project Settings - Read & Write nodes – Node software file name variables - File formats - Color space in node software - Color space LUT & viewer LUT - Reformat Animation Parameters – Curve Editor – Keying – Working with paint and rotoscoping – Color and Rotoscoping - 3D integration – Warping and Morphing Images – Tracking – Stabilizing – Image-based keying - Renders.

UNIT III:
User interface – Project – Sessions – Using the timeline – Adding note – Curve Editor – Nodes – Roto – Motion Blur – Paint – Clone Brush - Power Matte – Closed shape method – Blue/Green screen keying – zMatte – Pin Based warping – Shape-based warping - Morphing – Inverse Kinematics – Planar Tracker – Point Tracker – Offset Tracking – Modifying Tracking Data – Stereo paint – Rendering

UNIT IV:
Planar tracking - the lynchpin to mocha. Fast mask creation, inserts, and even 3D camera tracking are impossible without solid tracking data. Tougher tracks, Stabilization, Skin retouch, Camera Tracking Roto tips & tricks in mocha,3D camera solve, Removing lens flare, Techniques for removal, and background patching.

UNIT V:
The user interface, project overview, shot overview,3d perspective, an orthographic view, Useful Keys, Menus, tracking menu, camera menu, Import footage, Tracking Parameters, Color key, Clean Auto Feature Tracks, Survey Data, Camera Parameters, Solver Controls, Lens distortion, Depth Map, Importing footage, Footage format, footage properties, camera parameters, Auto feature tracking, Tracking length graph(Track-L), Tracking Error Graph(Track – E), Editing feature track F- Curves, creating masks, tracking masks, image masks, solving camera motion, constraints, survey data.

IV. References:

1. Nuke 101: Professional Compositing and Visual Effects Book by Ron Gambar
2. Digital Compositing with Nuke by Lee Lanier (Author)
3. The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures by Susan Zwerman (Editor), Jeffrey A. Okun (Editor)
4. The Art and Science of Digital Compositing: Techniques for Visual Effects, Animation and Motion Graphics (The Morgan Kaufmann Series in Computer Graphics) by Ron Brinkmann (Author)

Web resources suggested by the Teacher concerned and the college Librarian including reading material

V. a) Co-Curricular Activities:

- Workshop/Seminar on VFX techniques and projects
- Assignments on compositing
- Study tour for the Outdoor and Indoor shooting to collecting own footage for VFX
- RVJ (Reflective Visual Journal)

b) Suggested Co-Curricular Activities:

- Training of students by related field experts.
- Skill Development through Group discussions, Quiz, Debates, etc
- Preparation of videos and PPT's for the subject related presentations
- Collection of material on the topics using Internet
- Invited lectures and presentations on related topics

COURSE 6: COMPOSITING - II

Practical   Credits: 3   3 hrs/week

VI. List of Experiments:

1. Working with nodes
2. Working with Chrome Keying
3. Working on Rotoscoping
4. Human Rotoscoping
5. Animal Rotoscoping
6. Object adding or removing with the Paint
7. Day to night converting + Color Correction
8. 3D Compositing in live-action short
9. Working with Hair Rotoscoping
10. Tracking and Stabilizing