

**Raja Mansingh Tomar Music & Arts University**  
**Gwalior, M.P.**

**Bachelor of Design**  
**Game Design**

**Duration - 4 Years**

**Syllabus**

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**Raja Mansingh Tomar Music & Arts University, Gwalior, M.P.**  
**Bachelor of Design Game in Design Syllabus**

**SCHEME OF EXAMINATION**

**B. DESIGN GAME DESIGN YEAR I**

Paper	Time	External Marks	C.C.E.	Total
Fundamental of Art	3 Hrs.	70	30	100
History of Games	3 Hrs.	70	30	100
Fundamental of Game Design	3 Hrs.	70	30	100
			Total	300
Practical		External Marks	Internal Assignment	
Sketching	3 Hrs.	60	40	100
Principles of Animation	6 Hrs.	60	40	100
Pre-Production I	3 Hrs.	60	40	100
Introduction to Digital Tools I	6 Hrs.	60	40	100
			Total	400
Grand Total				700

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**Bachelor of Design Game in Design Syllabus**

**B. DESIGN GAME DESIGN YEAR I**

**Paper – I (Theory) – FUNDAMENTAL OF ART**

- Line: Definition of Line, Lines And Visual Illusion, Line And Impression, Different Types of Lines And Drawings, Development And Possibilities of Line Drawings, Knowing The Tools And Materials, Drawing – Its Evolution And Possibilities, Line-Visual Kinetics (Flow And Weight), Energy And Lines, Other Values of Line Etc.
- Form: Definition of form, Classification, Impression, Visual And Formal Weight And Colours, Forms And Proportion, Form And content, Form And Space Etc.
- Colour: Definition, Knowledge of Colours, Colour Wheel, Characteristics of Colour (Guna And Doshas), Classification of Colour, Colour And Feeling, Complementary And Opposite Colours, Cause of Change, Colour Schemes, Experiments In Colours Etc.
- Tone: Definition, Classification, Impression, Tone-Its Importance And Application, Emotional Aspects of Tone, Relation of Tone With Space Etc.
- Texture: Meaning & Definition, Classification, Texture And Space, Texture And Principles of composition, Texture Creating Tools And Ways of Creating Texture, Texture Exploration, Texture And Painting, Texture And Sculpture Etc.
- Space: Definition, Space Division, Theories/Principles Relating Space, Division, Role Of Space (Negative/Passive, Passive/Active, Neutral/Assisting And Their Importance), Organization Of Form And Its Relation To Space Etc.
- What is composition (general meaning and definition)
- Unity: Definition, object, unity and vision, unity and visitor, unity and relativity, unity creation in painting, unity and opposite (discord)
- Harmony: Definition, line-harmony, form-harmony, texture-harmony, conceptual harmony, colour harmony, process of harmony creation etc.
- Balance: definition, balance and visual weight (line, form, colour and tone), principles of balances etc.
- Dominance: Definition and object, fundamentals, dominance and background, ways to create dominance point of interest in a painting space.
- Rhythm: Definition, different types, ways of creating rhythm, feeling of rhythm.
- Proportion – Definition, Proportion and space division, form and proportion, colour and proportion, human forms and proportion etc.
- Perspective – Definition, different types of perspective, terms relating to perspective, geometrical forms and perspective, imaginative perspective.
- Medium and methods – All about painting medium and methods relating to creation
- Drawing and rendering – Definition, problem relating two dimensional drawing and rendering, and three dimensional effects, do's and don'ts in it.

**Suggested Reading**

1. Art Fundamentals: Color, Light, Composition, Anatomy, Perspective, and Depth by 3DTotal Team (Author), Gilles Beloeil, Andrei Riabovitchev, Roberto F. Castro



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**PAPER – II (THEORY) – HISTORY OF GAMES**

- The World Before Pong, Father of the Industry, Arrival of Pong
- The King and Court, Space War, The Jackals
- The Return of Bushnell, The Golden Age (1979-1983)
- A Case of two Gorillas, The Fall, The Aftermath
- The Birth of Sega
- Nintendo – Othello (First Arcade Game), Donkey Kong, Tetris, Super Mario Bros, Release of Super NES Console, Saturn, Virtual Boy, 64-Bit Nintendo 64 Game Console in Japan, Golden Eye 007, The legend of Zelda: Ocarina of Time of Nintendo 64, Game cube, Game Boy Advanced
- Atari – First Pizza Time Theatre Football, Lunar Lander, The Pacman Fever- The American Video Game Boom of the early 1980s, Tempest, ET, Pitfall,
- Midway – Ms. Pac-Man, Space Invaders, Square Soft – Final Fantasy, Final Fantasy 7
- Capcom – Street Fighter 2
- Sony – Play Station, Crash Bendicoot, Play Station 2
- Bandai – Tamagotchi
- Microsoft – Xbox
- Pokémon, Mortal Kombat
- The Next Generation Games

**Suggested Reading**

1. The Ultimate History of Video Games : From Pong to Pokemon - The Story Behind the Craze That Touched Our Lives and Changed the World by Steven Kent

**PAPER – III (THEORY) – FUNDAMENTALS OF GAME DESIGN**

- Game Genres, New world of gaming: Mobiles, online distribution & touch screen.
- People involved in game design – Roles of programmer, artist, designer, producer, tester, composer, sound designer, writer
- Elements of Gameplay – Unique solutions, Non Linearity, Modeling reality, teaching the player, input/output, basic elements
- Stages of Production in the Game Pipeline
- Level Design in Games
- Asset Creation for games
- Artificial Intelligence – The Goals of Game AI, AI Agents & their environment
- Gameplay Working – The organic process, Building the game – core technology, incremental steps, fully functional area, going through the changes, programming

**Suggested Reading**

1. Game Design: Theory and Practice (2nd Edition) (Wordware Game Developer's Library) 2nd Edition by Richard Rouse III (Author)
2. Level Up! The Guide to Great Video Game Design by Scott Rogers
3. Challenges for Game Designers 1st Edition by Brenda Brathwaite
4. Game Design Workshop: A Playcentric Approach to Creating Innovative Games, 3rd Edition by Tracy Fullerton



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## **B. DESIGN GAME DESIGN YEAR I**

### **PRACTICAL**

#### **PRACTICAL 1 – SKETCHING**

##### **COURSE OUTLINE**

- Study of various objects in pencil & color
- Study of drapery, pots, jugs, glass, random objects.
- Animating Still life –
  1. Draw a still life of random objects
  2. Draw another still life of the same objects but altering the still life showing what would happen if the objects come to life or if an external force acts upon them like wind, water, etc.
- Mannequin with Proportions – Male & Female
- Front, Profile & Back View
- Human Gestures
- 2d to 3d Visualization Exercises
- Life Drawing – with model & scenes from daily life
- Fundamentals of perspective
- One point, Two Point & Three Point Perspective
- Eye Level & Vanishing Point
- Make free hand sketches of room interiors, etc.
- Color Study – Basic Terms & Scales, Complementary Colors, Warm Colors & Cool Colors.
- Creative Compositions with natural & manmade forms.
- Landscapes in Monochrome (greyscale, warm colors & cool colors) & Multichrome

##### **PRACTICAL SUBMISSION**

1. Still Life – 5 (2 in pencil shading & 3 in color)
2. Nature Study – 5 (2 in pencil shading & 3 in color)
3. Animated Still Life - 1 (pencil shading only)
4. Mannequin for animation - 2 (1 Male & 1 Female)
5. Front, Front ¾, Profile, Back ¾ & Back View – 2 (1 Male & 1 Female)
6. Human Gestures - 30
7. Life Drawing - 30
8. One Point – 2
9. Two Point – 2
10. Three Point – 2
11. Vanishing Point - 2
12. Composition – 4
13. Landscape – 5 (greyscale, warm colors, cool colors, monochrome, multichrome) + 1 (All Colors)

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##### **Suggested Reading**

1. Light, Shade and Shadow (Dover Art Instruction) by E. L. Koller
2. How to Draw What You See (Practical Art Books) by Rudy De Reyna



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**PRACTICAL II - PRINCIPLES OF ANIMATION**

**COURSE OUTLINE (To be done on light box)**

- Twelve Principles of Animation (Timing, Ease In and Out (or Slow In and Out), Arcs, Anticipation, Exaggeration, Squash and Stretch, Secondary Action, Follow Through and Overlapping Action, Straight Ahead Action and Pose-To-Pose Action, Staging, Appeal, Personality)
- Timing for classical animation
- Introduction to Exposure Sheet
- Introduction to ladder
- Arcs of motion, hook-up & in-between, wave principal, S & C curve, follow through & overlap Action.
- Posing and Gesture, blocking performance through thumbnails.
- Different types animation - Rough in-between, key frames, (pose to pose) & straight-ahead animation.
- Ball & Tail : Rough animation with sense of timing and pushing the emotion in the character design. Principles of the anthropomorphic walking character.
- Basic Principles of Animation reviewed in relation with walk cycle - Timing, staging, arc of motion, mass and weight, center of mass, path of action, squash and stretch

**PRACTICAL SUBMISSION**

**To be submitted on A4 Size blank Paper binded in a book**

- Twelve Principles of Animation (Timing, Ease In and Out (or Slow In and Out), Arcs, Anticipation, Exaggeration, Squash and Stretch, Secondary Action, Follow Through and Overlapping Action, Straight Ahead Action and Pose-To-Pose Action, Staging, Appeal, Personality)
- Rolling Coin Animation
- Bouncing BALL – Parallel, Perspective, Iron Ball, Rubber Ball & Plastic Ball
- Wave Principles – Flag Animation, Follow Through with path of action
- Pendulum with follow through
- Canon Ball Animation
- Overshoot Animation
- Drag Animation
- Water Drop Animation
- Weight Lift & Toss Animation (Bean Bag & Real Character)
- Walk Cycle – Thin Person (Male & Female), Heavy Person (Male & Female)

**Suggested Reading**

1. The Animators Survival Kit by Richard E. Williams
2. Cartoon Animation (Collector's Series) by Preston Blair

**PRACTICAL 3 – PREPRODUCTION I**

**COURSE OUTLINE**

❖ **CHARACTER DESIGN (2D Games)**

- Introduction to Character design & Character rotation
- Basic shapes and structure lines used in character design
- Proportion, Balance, Weight and Silhouette
- Construction of character through the structure of forms that build a character proportions.
- Character Turn Around



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- How are game characters different from characters used in animation movies
- Study of comic characters
- Case study of 2d game characters –
  - Angry Birds
  - Bad Piggies
  - Cartoon Wars
  - Zombie Dash
  - Shadow Fight
- Movement of game characters – normal walk, power up, boost
- Facial Expression of characters in 2d games

❖ **BG & LAYOUT**

- Gestural Drawing - Economy of Line
- Filling Up The Frame- Effective Use of Visual Layers
- Introduction to Animation Layout
- Composition - Principles of Composition, Formal Composition, Technical Aspects of Composition, Framing the Shot, Principles of Staging, Flat Image and Space behind it
- Perspective - Types of Perspective, Linear Perspective, Surfaces in Perspective, Perspective and Grids, Freehand, Observational Perspective
- Camera - Position /Angles, From close up to wide shot, Camera Moves: Track in and Track out, Up-shots and Down-shots, Field Guides, Field Charts and Field Positions, "Horizontal, Vert. Pan" (repeat an), Swish Pan
- Image + Time, Continuity, (Hook-ups), Storyboard: Exposition, Rising action, Climax (turning point), Falling action, Resolution
- Style Explorations
- Layout Analysis In Visual Storytelling: An Introduction
- Types of Layout: Traditional Layout, Digital layout
- Level separation (Foreground, middle ground, background)
- Layout process, Production Process from Storyboard through Workbook, Rough Layout and Clean Layout to Ready Layout, Layout Clean-up
- Adopting given style.
- Principles from traditional experience into contemporary (modern) digital application.
- Lighting, Mood Tonal Rendering, Mood development, Strong expression of Story described with stage lighting, Emotions/Atmosphere.

**PRACTICAL SUBMISSION**

**To be submitted on A3, A4 Size sheets**

1. Different Mannequin for animation – human & cartoon
2. Design own character with cleanup – Human & Animal
3. Turn around character developed both human & animal
4. Character balance, weight & proportion
5. Character Posing & Gestures Drawing
6. Use character from movies and make them into a game character – 4
7. Convert Marvel or DC comic characters into 2d game characters - 6
8. Develop new characters for the games given in the course outline. - 5
9. Develop facial expressions for the new characters developed above – 3 each
10. The students have to develop new layouts adapting the style of these games –
  - God of War

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- Angry Birds
- Mario
- Dragon Age
- Clash of Clans

11. Texture & Pattern (color & pencil) – Study texture & patterns of the styles developed in the adopting given style exercise – 1 sheet on texture (Minimum 6 textures) & 1 sheet on pattern
12. Camera Angles – Use all camera angles in any one of the styles developed.
13. Lighting & Mood development (In Color) – Using the same area developed in style adaptation develop sheets depicting different moods – Suspense, Happy, Sad, Horror (1 Each)

**Suggested Reading**

1. Perspective Drawing Handbook by Joseph D Amelio
2. Setting the Scene: The Art & Evolution of Animation Layout by Fraser MacLean
3. Creating Characters with Personality by Tom Bancroft
4. Character Mentor by Tom Bancroft
5. Drawing Basics and Video Game Art: Classic to Cutting-Edge Art Techniques for Winning Video Game Design by Chris Solarski
6. Understanding Comics: The Invisible Art by Scott McCloud

**PRACTICAL 4 – INTRODUCTION TO DIGITAL TOOLS**

**COURSE OUTLINE**

- Introduction to hardware and software - Digital asset management and directory structure, Pros and Cons of Digital Animation, Digital vs Analogue, Screen resolution: NTSC, Wide-screen, PAL
- ADOBE PHOTOSHOP - Introduction to Photoshop, Using Layers, Using the scanner, Raster vs Vector graphics, RGB vs CMYK, Output formats and file compression, Additional tools and workflows, Using Alpha Channels and Layer Masks, Pixel, Resolution, Render

**PRACTICAL SUBMISSION**

**Output on computer (Photoshop)**

1. Photoshop - Digital Painting: Own character that was developed from Practical 3 to be used
2. Character Concept Art (1)
3. BG Concept (2)
4. Layout Concept (1)

**Suggested Reading**

1. Adobe Photoshop CS6 Bible by Lina Danae Dayley



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**SCHEME OF EXAMINATION**

**B. DESIGN GAME DESIGN YEAR II**

Paper	Time	External Marks	C.C.E.	Total
Nonlinear Storytelling	3 Hrs.	70	30	100
Level Design	3 Hrs.	70	30	100
Game Engine	3 Hrs.	70	30	100
			Total	300
Practical		External Marks	Internal Assignment	
Storytelling & Level Design	6 Hrs.	60	40	100
Game Assets (2d Games)	3 Hrs.	60	40	100
Game Engine (2d Games)	6 Hrs.	60	40	100
Final 2d Game Design Project	3 Hrs.	60	40	100
			Total	400
<b>Grand Total</b>				<b>700</b>



**Bachelor of Design Game Design Syllabus****B. DESIGN GAME DESIGN YEAR II****PAPER – I (THEORY) – NONLINEAR STORYTELLING**

- Telling the story - Once upon a time, Bringing the story to life
- Conflict: The fuel of Story
- The hero's Journey & Structure of game story
- Story Flow & Progression, Making Stories Emotional
- Missions & Final Goal
- The three act structure, Monomyths, Characters & arcs
- Dialogues, Exposition, Believability
- Different Type of Stories - Multiple Ending Stories, Branching Path Stories, Open End Stories, Fully Player driven Stories
- What Players Really Want?

**Suggested Reading**

1. Video Game Storytelling : What Every Developer Needs to Know about Narrative Techniques by Evan Skolnick
2. Interactive Storytelling for Video Games: A Player-Centered Approach to Creating Memorable Characters and Stories by Josiah Lebowitz
3. Game Writing: Narrative Skills for Videogames (Charles River Media Game Development) 1st Edition by Chris Bateman

**PAPER – II (THEORY) – LEVEL DESIGN**

- Game Design vs Level Design, Level Design Goals & Hierarchies,
- Level Design – levels in different games, level separation, level order, level flow. Who does level design?
- Components of a level – action, exploration, puzzle solving, story telling, aesthetics.
- Elements of a good level – Players can not get stuck, Sub goals, landmarks, critical path, limited back tracking, success the first time, navigable areas clearly mark, choices.
- Level Design Process – Preliminary, Conceptual & sketched outlines, Base architecture, base gameplay, refining gameplay, architecture, aesthetics, play testing

**Suggested Reading**

1. Game Design: Theory and Practice by Richard Rouse III
2. Level Design: Concept, Theory, and Practice 1st Edition by Rucol Knerr

**PAPER – III (THEORY) – GAME ENGINE**

- What is a game engine?
- Engine Differences across genres
- Runtime Engine Architecture
- Tools & The Asset Pipeline
- 3D Math for games – Solving 3D problems in 2D, Points and vectors, Matrices, Quaternions, Comparison of Rotational Representations, Other useful Mathematical Objects

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- Real World Mechanic – Principles of Vectors, Defining 2D & 3D Space, 2D Game in a 3D Game Engine, Local and World Coordinate systems, Laws of Physics, Physics and the principle of Animation, 2D & 3D Tricks for Optimizing Game Space, Fog, Moving Textures, Blob Shadows
- Animation Mechanics – Sprites, Texture Atlas, Animated Sprites, Baked 3D Animation, Biomechanics, Single 2D Sprite Actions, Single – Filed 3D Animation, Secondary Animation, Skinning & Matrix Palette Generation, Animation Blending, Post – Processing, Compression Techniques, Animation System Architecture, Animation Pipeline, Action State Machines, Animation Controllers
- Game Rules and Mechanics – Primary Mechanics – Searching, Matching, Sorting, Chancing, Mixing, Timing, Progressing, Capturing, Conquering, Avoidance, Collecting, Matching & Sorting, Shooting, Hitting, Bouncing, Stacking, Racing, Avoidance & Collecting, Searching, Rewards & Penalties
- Character Mechanics - Line of sight, Graph Theory, Waypoints, Finite State Machine, Flocking, Decision trees, Fuzzy Logic
- Layer Mechanic – User Profiling, Metaphor, Feature Exposure, Coherence, Shortcuts, Layout, Focus, Help, Inventories, Teleportation
- Environment Mechanics – Map Design, Fundamentals, Terrain, Skies, Weather Particles
- Mechanics for External Forces – Gestures and Motion, 3D Viewing, Augmented Reality
- Low – Level Engine Systems – Engine Support Systems, Subsystem startup & Shutdown, Memory management, Engine configuration
- Game Loop & Real Time Simulation – The Rendering Loop, The Game Loop, Game Loop Architectural Styles, Abstract Timelines, Multiprocessor Game Loops, Network Multiplayer Game Loops
- Human Interface Devices (HID) – Types of Human Interface Devices, Interfacing with HID, Types of inputs and outputs, Game Engine HID Systems,
- Tools for Debugging and Development – Logging and Tracing, In Game Menus, In Game Console, Debug Cameras and Pausing the Game, Cheats, Screenshots and movie capture, In Game Profiling
- Rendering Engine – Foundation of Deep Buffered Triangle Rasterization, Advance Lighting & Global Illumination, Visual Effect and Overlays
- Collision and Rigid Body Dynamics – Collision Detection System, Rigid body Dynamics, Integrating a Physics Engine into your Game
- Game Play Systems – Anatomy of a Game World, Implementing Dynamic Elements Game Objects, Data – Driven Game Engines, Game World Editor
- Engine Support Systems – Subsystem Start-up and Shut-Down, Memory Management, Containers, Strings, Engine Configuration
- Human Interface Devices – Types of human interface devices, interfacing with a HID, Types of Inputs, Types of Outputs, Game Engine HID systems, Human interface Devices in practice.
- Introduction to gameplay systems – Anatomy of a Game World, Implementing Dynamic Elements: Game Objects, Data-Driven Game Engines, Them Game World Editor
- Handling Platform differences – preprocessor directives, getting access to unity, access to platforms

**Suggested Reading**

1. Game Engine Architecture, Second Edition by Jason Gregory
2. Holistic Game Development with Unity: An All-in-One Guide to Implementing Game Mechanics, Art, Design and Programming by Penny de Byl



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**B. DESIGN GAME DESIGN YEAR II**

**PRACTICAL**

**PRACTICAL 1 - STORYTELLING & LEVEL DESIGN**

**COURSE OUTLINE**

- Telling the story - Once upon a time, Bringing the story to life
- Conflict: The fuel of Story
- The hero's Journey & Structure of game story
- Story Flow & Progression
- Making Stories Emotional
- Missions & Final Goal
- The three-act structure
- Monomyths
- Characters & arcs
- Dialogues
- Exposition
- Believability
- Multiple Ending Stories
- Branching Path Stories
- Open End Stories
- Fully Player driven Stories
- What Players Really Want?
- What is game interface design?
- Study game interface of famous 2d games
- Storyboarding for games
- Concept Work
- Building the level
- Gameplay & Goals
- Structure & Progression
- Flow Control
- Level of Difficulty
- Balance, Puzzles & Problems
- Case study of famous 2D Games of different genres

**PRACTICAL SUBMISSION**

1. Write your own story for a 2D game.
2. Develop character for your story
3. Do storyboarding of the story developed from start to conclusion
4. Study levels used in angry birds, zombie dash & hill climb racing. Develop own levels adapting the style from these games – 6.
5. Create 6 levels with increasing difficulty for your own game following the storyboard developed

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**Suggested Reading**

1. Video Game Storytelling: What Every Developer Needs to Know about Narrative Techniques by Evan Skolnick
2. Interactive Storytelling for Video Games: A Player-Centered Approach to Creating Memorable Characters and Stories by Josiah Lebowitz
3. Game Writing: Narrative Skills for Videogames (Charles River Media Game Development) by Chris Bateman
4. Game Design: Theory and Practice by Richard Rouse III
5. Level Design: Concept, Theory, and Practice 1st Edition by Rudolf Kremers
6. Level Design for Games: Creating Compelling Game Experiences by Phil Co
7. An Architectural Approach to Level Design by Christopher W. Totten

**PRACTICAL 2 – GAME ASSETS (2D GAMES)**

**COURSE OUTLINE**

- What are game assets?
- Different Types of game assets
- Props for games
- Study of props in 2d games
- Animation of assets, effects of assets
- UI/Ux for 2D Games
- Developing Sprite Sheets for developed assets.
- Case study of famous 2D Games of different genres
- What is a concept artist?
- Video Game Production Pipeline for concept artist
- Importance of concept art
- Case Studies of concept art in famous 2d games.
- Introduction to Adobe Flash
- Intro and Workflow Theory
- Compare differences between Paperless Animation and Traditional Animation - Discuss methods of planning animation to ensure that the student is controlling the performance and not the program.
- Visualize methods to transform a paperless skill from one software package to another
- Introduction to Paperless Animation
- Rough animation methods
- Demonstrate the 'Cleanup process
- Illustrate efficient 'Colouring' methods
- Introduction to Symbol Animation Design and create a character for a cutout character
- Break character down in preparation for rigging
- Construct rig for cutout character
- Pose and Animate cutout character
- Types of movements used in games
- Compositing and Editing
- Introduction to Compositing software
- Visualize a scene with existing animation
- Build scene with imported Animation and created layouts from visualization
- Demonstrate the ability to manipulate a camera through this scene



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**PRACTICAL SUBMISSION**

- Study props used in angry birds, zombie dash, shadow fight, hill climb racing, etc. Develop own props adapting the style from these games – 40 assets
- Develop Sprite Sheets & UI for your own 2D Game developed in Practical 1.
- Develop concept art adapting styles from games in case study – 15
- Develop concept art for own 2D game developed in Practical 1.
- Create animation loops for game characters like walking, running, jumping, etc. (minimum 3 characters from different game genres). Export .png sequence of all developed loops to be used in sprite sheets.
- Create effects for game assets & export in .gif or .png image sequence to be used in sprite sheets.

**Suggested Reading**

1. The Art of Game Design : A Book of Lenses by Jesse Schell
2. Drawing Basics and Video Game Art: Classic to Cutting-Edge Art Techniques for Winning Video Game Design by Chris Solarski
3. Drawing Basics and Video Game Art: Classic to Cutting-Edge Art Techniques for Winning Video Game Design by Chris Solarski
4. The Art of Blizzard Entertainment by Nick Carpenter
5. The Art of Video Games: From Pac-Man to Mass Effect by Chris Melissinos
6. Art of Atari by Tim Lapetino
7. Animation from Pencils to Pixels: Classical Techniques for the Digital Animator by Tony White
8. Adobe Flash Professional CS5 Bible by Todd Perkins

**PRACTICAL 3 – GAME ENGINE (2D GAMES)**

**COURSE OUTLINE**

- What is game engine?
- Types of game engines
- Introduction to unity
- Unity for 2D games
- Character Building in Unity, Planning Behaviors
- Introducing the Unity Sprite System – Importing Sprites, Sprites Editor
- Sprite Animation – Setting up animation controllers, Setting up animation clips, Connecting animation states, Accessing controllers from a script
- The Game – Background & Layers, Building the scene, Working with the camera, Transitioning & bounds, Backgrounds & active elements, Shaders
- NPC's & Interaction – Getting the NPC's talking, Building a basic conversation system,
- Types of maps, Screen Space & World Space
- Adding the map, adding places of interest, Creating MapPoint prefabs for reuse, Updating Navigation Prompt Script, Updating Navigation Manager Script, Travelling by click or touch, Transitions, Updating Build settings to include new screens
- Shop – Building your Shop, Laying out your inventory, getting paid,
- Efficient RPG UI overlays, The battle state manager, Starting The battle, Selecting Weapons, GUI
- Levelling Up, Balancing, Preparing the battle manager script, beefing up the enemy, selecting a target, mixing up 2D & 3D, Particle effects & 2D, creating materials for particle effects.
- Events Systems, Exploring Randomness, Basic AI, State Machines, Sensors,



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- Building in game menu structures – the screens, The flow
- Working with settings – Using Player Prefs, Serializing your data
- Handling Platform differences – preprocessor directives, getting access to unity, access to platforms

**PRACTICAL SUBMISSION**

1. Develop at least one of each elements mentioned in the course outline on Unity.

**Suggested Reading**

1. Game Engine Architecture by Jason Gregory
2. Holistic Game Development with Unity: An All-in-One Guide to Implementing Game Mechanics, Art, Design and Programming by Penny de Byl
3. Mastering Unity 2D Game Development - Building Exceptional 2D Games with Unity by Simon Jackson

**PRACTICAL 4 – FINAL 2D GAME DESIGN PROJECT**

**COURSE OUTLINE**

- Creating Storyline & Storyboard for your own game.
- Develop Characters, Environments, Levels & Assets
- Develop Animation Sprites & Assets Sprite Sheets
- Import all to unity
- Create Rules & Logic
- Develop the entire functioning game in UNITY
- Rules of game testing
- Being a game tester – Gamers vs testers, Playing games, identifying bugs, amplifying problems
- Why testing is important?
- Software Quality – Game Quality Factors, Game Quality Appraisals, Game Standards, Game Quality Measurements, Quality Plans
- Test Phases – Pre – Production, Planning Tasks, Alpha Testing, Beta Testing, Gold Testing
- Black Box Testing, White Box, Testing, The Life Cycle of a build
- Combinatorial Testing – Parameters, Values, Constructing Tables, Combinatorial Templates, Combinatorial Test Generation, Combinatorial Economics
- Test Flow Diagrams – TFD Elements, TFD Design Activities, TFD Paths
- Cleanroom Testing – Usage Probabilities, Cleanroom Test Generation, Inverted Usage
- Test Trees – Test Case Trees, Tree Feature Tests, Test Tree Diagrams
- Gameplay Testing
- Defect Triggers – Operation Regions, The triggers, Classifying Defects, Defect Triggers & Test Designs
- Regression Testing & Test Reuse
- Capture / Playback Testing

**PRACTICAL SUBMISSION**

1. Following the procedure mentioned in course outline develop your own 2d game in unity
2. Create a trailer for the game developed
3. Following the procedure mentioned in course outline develop your own 2d game in unity
4. Create a trailer for the game developed



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5. Do Case Study & game testing of famous 2D games following the testing pipeline & develop reports for the same – 4
6. Do game testing of your own developed game in Final 2D Game Design Project

**Suggested Reading**

1. Game Engine Architecture by Jason Gregory
2. Holistic Game Development with Unity: An All-in-One Guide to Implementing Game Mechanics, Art, Design and Programming by Penny de Byl
3. Mastering Unity 2D Game Development - Building Exceptional 2D Games with Unity by Simon Jackson
4. Level Up! The Guide to Great Video Game Design by Scott Rogers
5. Game Testing: All in One by Charles P. Schultz
6. Game Development Essentials: Game QA & Testing by Luis Levy





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**SCHEME OF EXAMINATION**

**B. DESIGN GAME DESIGN YEAR III**

Paper	Time	External Marks	C.C.E.	Total
Game Psychology	3 Hrs.	70	30	100
Game Feel	3 Hrs.	70	30	100
Defining Rules	3 Hrs.	70	30	100
			Total	300
Practical		External Marks	Internal Assignment	
Alternative Character Design	3 Hrs.	60	40	100
3D Modeling & Texturing	6 Hrs.	60	40	100
Digital Sculpting (Z-Brush)	6 Hrs.	60	40	100
3D Rigging & Animation	6 Hrs.	60	40	100
			Total	400
Grand Total				700



**Bachelor of Design Game Design Syllabus****B. DESIGN GAME DESIGN YEAR III****PAPER – I (THEORY) – GAME PSYCHOLOGY**

- Players – Why do perfectly normal people become crazy online? Why do people cheat hack & peek at Strategy Guides, Nostalgia about old games, why are Fanboys and Fangirls so ready for a fight?
- Game Makers - How do games get us to keep score and compete? How do games get us to grind, complete side quests, and chase achievements? How do developers keep us so excited about new loot?
- Game Seller – How do games make us feel immersed in imaginary worlds? Why do we go crazy for digital Game sales?, How do games and apps get you with in-game purchases?, How do games keep players paying?, How do games get players to market to each other?
- The Games – Do we shape our in-game Avatars or do they shape us? Why do we like violent games so much? And should we be worried that we do? Do video games make you smarter?
- The Building block of emotional design, designing for multiplayer emotions, using movement design to create emotions and connections, Bridging distance to create intimacy and connection.
- Game addiction and internet gaming disorder, Social outcomes : online gameplay, social currency & social ability, Video game and cognitive performance

**Suggested Reading**

1. Getting Gamers: The Psychology of Video Games and Their Impact on the People who Play Them by Jamie Madigan
2. How Games Move Us: Emotion by Design (Playful Thinking) by Katherine Isbister

**PAPER – II (THEORY) – GAME FEEL**

- Defining Game Feel
- Principles of Game Feel
- Game Feel and Human Perception
- The Game Feel Model of Interactivity
- Mechanics of Game Feel
- Metrics for Game Feel – Input Metrics, Response Metrics, Context Metrics, Polish Metrics, Metaphor Metrics, Rules Metrics
- Case Study – Super Mario Brothers, Asteroids, Bionic Commando, Super Mario 64, Raptor Safari

**Suggested Reading**

1. Game Feel: A Game Designer's Guide to Virtual Sensation (Morgan Kaufmann Game Design Books) 1st Edition by Steve Swink

**PAPER – III (THEORY) – DEFINING RULES**

- Defining Rules
- Rules on Three Levels
- The Rules of Digital Games
- Games as Emergent Systems
- Games as Systems of Uncertainty
- Games as Information Theory Systems
- Games as Systems of Information
- Games as Cybernetic Systems
- Games as Game Theory Systems
- Games as Systems of Conflict
- Breaking the Rules

**Suggested Reading**

1. Rules of Play: Game Design Fundamentals (MIT Press) by Katie Salen Tekinbas, Eric Zimmerman

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**Bachelor of Design Game Design Syllabus**

**B. DESIGN GAME DESIGN YEAR III**

**PRACTICAL**

**PRACTICAL 1 - ALTERNATIVE CHARACTER DESIGN**

**COURSE OUTLINE**

- Introduction to Figure Drawing - Drawing to Animation (any one drawing is only part of a whole)
- Introduction to the Skeleton - Volumetric rotations, axis lines, horizontal and vertical mechanics of the skeleton
- Capture the human and animal form effectively using observational drawing skills.
- Explain the relationship between time and the fundamental elements of life drawing.
- Create drawings that reflect figurative rhythmic, structural and proportional aspects of the human form
- Dynamic gesture; Directional Forces How and Why of Application throughout the Figure, Continuous gesture, multiple poses and memory studies.
- The Spine - Anatomy and Structure Curves, relationship to the skull, rib-cage
- The Pelvis and Shoulder Girdle - Anatomy and Structure, Torso Movement, Relationship to the leg and whole figure
- Upper leg and attachment to the pelvis, knee and foot - Joint Movement, Foot Placement (space)
- The skull - Basic structure, rotations, planes and divisions, Skull/neck relationship, Insertion into torso
- Animal Drawings, Quick Gestures Animals
- Review of the human skeleton and major joints, Basic Joint Movement Terminology, Introduction to the muscles of the upper torso, front and back
- The Arm and the Shoulder, Relationship to the Torso, Main Muscle Groups
- The Leg and Buttock, Relationship to the Torso, Main Muscle Groups
- Muscles of the Complete Torso, Mass, volume, movement, form and function
- Muscles of the Hand and Foot
- Introduction to the Walk Cycle, Leg movement, Muscles of the hip, knee, ankle, toe
- Muscles of the Head, Neck and Face, Neck insertion, head rotation
- Facial muscles and features, facial triangle, Review of Human Anatomy
- Overview of anatomy of four legged animals
- Superheroes and Villains: Design, Character Construction, Deconstruction, Continuity of Distortion. Double model. Facial caricature. Media Studies: marker and inks.
- Monsters and Aliens. Transmogrifications of the model continued
- Introduction to Exploring Character and Costume
- Relationship of gesture to costume (dynamics of major folds)
- Relationship between costume, structural anatomy and lyrical & dynamic poses
- Line quality and specific fabric characteristics
- Character mood and psychology
- Costume, light and shadow and design continuity
- Character, archetypes and art direction
- Costume drawing and aesthetics
- Costume, character, performance and humor
- Pattern design, texture and color investigation

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**PRACTICAL SUBMISSION**

1. Dynamic Poses – 5
2. Animal Quick Gestures – 10
3. Complete Human Skeleton -1
4. Spine - Anatomy and Structure Curves, relationship to the skull, rib-cage – 1 each
5. The Pelvis and Shoulder Girdle - Torso Movement, Relationship to the leg and whole figure – 1 each
6. Hands- Upper part, Lower part & finger bones – 1 each
7. Upper leg & Lower Leg – 1 each
8. Knee and Foot - Joint Movement, Foot bones – 1 each
9. The Skull - Basic structure, rotations, planes and divisions – 1 each
10. The Arm and the Shoulder – 1 each
11. Leg and Buttock – 1 each
12. Muscles of the Complete Torso – 1 each
13. Muscles of the Hand and Foot – 1 each
14. Muscles of the Head, Neck and Face – 1 each
15. Muscles of the hip, knee, ankle, toe – 1 each
16. Facial muscles and features – 3
17. Acting poses with memory drawing - 3
18. Superheroes Character Design – 3
19. Villains Character Design - 3
20. Witch – 2 costumes according to mood of witch
21. Monster Design - 3
22. Alien Design - 3
23. Mythological Characters & Creatures - 5

**Suggested Reading**

1. An Atlas of Anatomy For Artists by Fritz Schider
2. Anatomy & Drawing by Victor Perad
3. Drawn to Life- Vol – 1 by Walt Stanchfield & Don Hahn
4. An Atlas of Animal Anatomy for Artists by W. Ellenberger
5. Character Design from the Ground Up: Make Your Sketches Come to Life by Kevin Crossley
6. Creating Characters with Personality: For Film, TV, Animation, Video Games, and Graphic Novels by Tom Bancroft
7. A History of Costumes by Carl Kohler
8. Character Costume Figure Drawing: Step-by-Step Drawing Methods for Theatre Costume Designers by Tan Huaixiang

**PRACTICAL 2 – 3D MODELING & TEXTURING**

**COURSE OUTLINE**

- Introduction to Maya 3D Modeling Interface, use of mouse and keyboard, basic tools to be used in creating polygonal shapes and models. Descriptions of polygons, and the elements that make up a polygon in Maya, such as vertices, edges, faces, and UVs. Overview of file keeping, saving files and workspace views. Moving, scaling, rotating and placement of objects in the 3D environment.
- Lecture and Demonstration of new tools, including extrusion of faces, extrusion along a curve and Boolean operations. In class project to create a simple snowman, using spheres, cylinders and cubes to create hat, facial features, buttons and arms. Removal of extra intersecting geometry and labeling of

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 - Bottom right: A large signature, possibly "Rajendra".



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polygons to keep clean file with minimal geometry. Students to bring in a toy or a reference drawing of a hard surface, non-organic object for review to begin HARD SURFACE MODEL.

- Hand Model Project. Students will model an entire hand, including 4 fingers, thumb, palm and part of the wrist starting from a primitive cube and adding divisions, splitting polygons, extruding faces to create jointed digits, beveling edges, and refining the topology by adding, scaling and manipulating vertices of the geometry. Hand must resemble a human hand, not a robotic or cartoon 'Mickey Mouse' hand. Wire frame model must remain unsmoothed to retain a smaller file size with minimal geometry.
- Character Model Project. Demonstration and lecture on character designing for 3D modeling. Review of character designs, any revisions required and importing three views into Maya for reference. Students will learn new techniques of creating a symmetrical model by creating an instance of half the model and mirroring the operations performed to ensure equal geometry on each side of the 'Y' axis. Students are encouraged to model the character only, no drapery. Two or 4 legged traditional characters only, no robotic or non-organic characters. Designs must have head, body arms, legs, feet and hands.
- Game Environment Model with Lighting. Create different game environments, both high & low poly. This is brief introduction to mapping and lighting techniques.
- Hair & Fur on characters
- N-Cloth – Introduction to nCloth
- nDynamics & Dynamics
- Lighting Plugins in Maya For Rendering – Mental Ray, Arnold, V-Ray Render

**PRACTICAL SUBMISSION**

**To be done in Maya**

1. Hard Surface Model - Students to bring in a toy or a reference drawing of a hard surface, non-organic object (non- living) like cars, architecture, etc.
2. Hand Model - Model an entire hand, including 4 fingers, thumb, palm and part of the wrist.
3. Character Models – High Poly & Low Poly both (2 each)
4. 4 Legged characters - 2
5. Game Characters - 4
6. Creating hair on a character
7. Flag stimulation
8. Game Environment – Adapting the style of a famous 3d game develop a new game environment using V- ray

**Suggested Reading**

1. Digital Modeling by William Vaughan
2. Maya Character Creation: Modeling and Animation Controls by Chris Maraffi
3. Aesthetic 3D Lighting: History, Theory, and Application by Lee Lanier
4. Maya Studio Projects: Game Environments and Props
5. Game Character Development with Maya by Antony Ward

**PRACTICAL 3 - DIGITAL SCULPTING (Z - BRUSH)**

**COURSE OUTLINE**

- Sculpting Concepts – Comparing Traditional & Digital Sculpting, Anatomy for Sculptures, Proportions & Measurements, Form, Negative Space & Gesture.
- Digital Sculpting - Introduction to UI, Introduction to tools, Methods of Sculpting by the help of meshes in z brush, Making of Shield (Brush Strokes, Masking, Displacement)



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- Model a human skull
- Model human head with details
- Model human basic body
- A model imported from maya and fine tune
- Introduction to Z Sphere, Transpose, Modeling Animal using Zsphere
- Gesture poses
- Understanding of UV space and Texturing, Poly paint, Z App link
- Export of Normal, Displacement, Cavity maps
- Assignment - Create a fearsome warrior, a sportsman, a realistic old age face
- Realistic Character Modeling n Texturing - Building up Shapes - (Relative Scale, Form, Detailing), UV Layout & tiles in 3D space - (Planning, Techniques). Create new textures for painting their existing models, Utilize Projection Master to work with detail brushes and alpha, Brushes for highly detailed texture painting.
- Create realistic character texture painting
- Create texture for cartoons

**PRACTICAL SUBMISSION**

**To be done in Z Brush.**

1. Create a fearsome warrior
2. Create a sportsman
3. Create a realistic old age face
4. Create 1 displacement map and apply them in Maya

**Suggested Reading**

1. Sculpting from the Imagination: Z-Brush (Sketching from the Imagination) by 3DTotal Publishing
  2. Z-Brush Characters and Creatures by Kurt Papstein, Mariano Steiner, Mathieu Aerni, 3DTotal Team
- Introducing Z-Brush 3rd Edition (Serious Skills) by Eric Keller

**PRACTICAL 4 – 3D RIGGING & ANIMATION**

**COURSE OUTLINE**

- Joints, hierarchies, UV's and textures
- Rig applications problem solving
- Using constraints, scripts and utilities
- FK/IK joints and skinning
- Advanced Set driven key and rig systems
- Building advanced hierarchies and controls for posing
- Camera Rigging and render settings
- Advanced controls and custom attributes
- Deformation order and blendshapes
- Rivets, follicles, nulls and granular control systems
- Squash and stretch deformations and rigs
- Leg rigging, empty group nodes, custom pivot points
- Looking at different practical rig solutions
- Four-Wheeler Rigging
- Animation Essentials and Perception of Motion. Designing animation in Maya - 3D considerations. Timing, curves, handles, holds, slow in and out



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- Walk Cycle: How cycles work and PIXAR walk design. Planning animations-thumbnails and key poses. Gravity, balance, believable weight and driving forces. Center of gravity and legs. Time allowing begin upper body, arms and head. Adding squash and stretch
- Quadruped Walk Cycle
- Driving forces: mood, personality, attitude
- Analyzing dialogue: listen for weak and strong parts
- Planning animation: thumbnail out poses you see in your head. Acting it out: become the character for a few hours
- Blocking Pass: pose your character for basic feel and timing fine tuning and moving holds Second Pass: critical in-between overlapping action and overshoots
- Third Pass: block in facial expressions and simple mouth shapes
- Fourth Pass: head squash and stretch animation, eye and tongue details
- Lip-sync Pass: simplify - show dominant vowels and consonants
- Final Pass: fix mistakes and push the poses
- Character Multiple Action Performance-
- Rig planning: considerations and workflows Hierarchies: grouping, parenting and pivot points Bones: basic character hierarchy
- Inverse and forward kinematics
- Skinning: volume distribution and custom deformations -The arm, hand and leg The Face: blendshapes
- Advanced overview of squash and stretch rigging
- Camera rigging and motion paths

**PRACTICAL SUBMISSION**

1. Design a flexible and functional spine rig. This assignment will be an Introduction to using simple Maya constraints. Set Driven Key and groups.
2. Design an FK-IK arm and hand rig. Continue to expand on methods for manipulating maya joints and their related geometry. Editing and designing character skin weights.
3. Design a flexible and easy to pose quadruped rig. This assignment will be an introduction to using simple Maya constraints, SDK, connection editor and other tools.
4. Build a complete head/face rig. The controls developed for the face will reflect the CG animation process. There will be main overall controls for posing of the eyes and facial expressions but also a collection of finer controls for squash and stretch etc.
5. Squash & Stretch Assignment
6. Biped Walk Cycle Assignment
7. Quadruped Walk Cycle Assignment
8. Character Multiple Action Performances (Basic) – 2 Characters
9. Animate a car

**Suggested Reading**

1. Rig it Right! Maya Animation Rigging Concepts by Tina O'Hailey
2. How to Cheat in Maya 2014: Tools and Techniques for Character Animation by Kenny Roy
3. The Art of 3D Computer Animation and Effects by Isaac V. Kerlow







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**SCHEME OF EXAMINATION**

**B. DESIGN GAME DESIGN YEAR IV**

Paper	Time	External Marks	C.C.E.	Total
Artificial Intelligence in Gaming	3 Hrs.	70	30	100
Virtual Reality	3 Hrs.	70	30	100
Game Production & Management	3 Hrs.	70	30	100
			Total	300
Practical		External Marks	Internal Assignment	
Level Design (3D)	6 Hrs.	60	40	100
Game Assets (3D)	6 Hrs.	60	40	100
Game Engine (3D)	6 Hrs.	60	40	100
Final 3D Game Design Project	3 Hrs.	60	40	100
			Total	400
Grand Total				700

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**B. DESIGN GAME DESIGN YEAR IV**

**PAPER – I (THEORY) – ARTIFICIAL INTELLIGENCE IN GAMING**

- What is AI?
- Academic AI & Game AI Differences
- Model of Game AI – Movement, Decision Making, Strategy, Infrastructure, Agent Based AI
- What are algorithms, data structures & representations
- The Complexity Fallacy – When simple things look good, when complex things look bad, The perception Window & Changes of Behavior
- Kinds of AI in Games – Hacks, Heuristics & Algorithms
- Speed & memory – Processor Issues, Memory Concerns, PC Constraints, Console Constraints
- The AI Engine – Structure of AI Engine

**Suggested Reading**

1. Artificial Intelligence for Games by Ian Millington, John Funge

**PAPER – II (THEORY) – VIRTUAL REALITY**

- What is Virtual Reality – Stereoscopic Displays, Motion Tracking Hardware, Input Devices, Computing Platforms
- Applications of Virtual Reality – 360° panoramas, etc.
- Virtual Reality Hardware – What is Oculus Rift, Samsung Gear VR, Google Card Board
- Describe VR Input Devices
- How is VR used in Game Engines?

**Suggested Reading**

1. Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile 1st Edition by Tony Parisi

**PAPER – III (THEORY) – GAME PRODUCTION & MANAGMENT**

- Introduction – Production cycle, pre-production, production, testing, post production
- Project Management Methods
- Developer and Publisher Relationships – Pitching a game to a publisher, financing options, Managing developer publisher relationships, third party game approval
- Game Plan – Schedule, staffing, budgets, outsourcing, middleware
- Game Build & Testing – Build process, multilingual builds, build notes, preventing piracy, Testing Schedule, testing pipeline, testing cycle, external testing, game documentations.

**Suggested Reading**

1. The Game Production Handbook 3rd Edition by Heather Maxwell Chandler



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**B. DESIGN GAME DESIGN YEAR IV**

**PRACTICAL**

**PRACTICAL 1 – LEVEL DESIGN (3D)**

**COURSE OUTLINE**

- Concept Art for 3D Games.
- Level Design Goals & Hierarchies in 3D games
- Level Design – levels in different games, level separation, level order, level flow.
- Components of a level – action, exploration, puzzle solving, story telling, aesthetics.
- Elements of a good level – Players cannot get stuck, Sub goals, landmarks, critical path, limited back tracking, success the first time, navigable areas clearly mark, choices.
- Level Design Process – Preliminary, Conceptual & sketched outlines, Base architecture, base gameplay, refining gameplay, architecture, aesthetics.
- Level Design for different game genres
- Creating 3d environment for games.
- Planning the low polygon environment – technological assumptions, point of view, theme, Genre, World size, game fiction
- Modeling large urban environment – blocking out the level, setting up the grid, world measurement & Scale, modeling the path, UV mapping the meshes, repeating buildings, detailing
- Texturing the large urban environment – Texture creation, tiling base materials, non – tiling illumination mapped details, non – tiling full brightness details, non – tiling details requiring alpha channeling, creating alpha channel
- Introduction to natural environment - technological assumptions, perspective, theme, Genre, World size, game fiction
- Filling the world – terrain, manual terrain creation, free form terrain painting, terrain texturing, trees and foliage, plants, cloud, water, using mechanical and organic textures
- Interface Design in 3D Games
- Case Study of levels & user interface in famous 3d games like GTA V, Assassins Creed, Tomb Raider, NFS, Street Fighter, Battlefield, Dragon Age, Counter Strike, Hitman, Mario, etc.

**PRACTICAL SUBMISSION**

1. Developing 5 different concept art after case study
2. Adapting the style of any 2 games from the case study develop 2 levels for each game with user interface in MAYA.
3. Create 6 levels with increasing difficulty for your own game

**Suggested Reading**

1. An Architectural Approach to Level Design by Christopher W. Totten
2. Level Design for Games: Creating Compelling Game Experiences by Phil Co
3. Game Development Essentials: Game Interface Design 2nd Edition by Kevin Saunders, Jeannie Novak
4. 3D Game Environments: Create Professional 3D Game Worlds by Luke Ahearn



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**PRACTICAL 2 – GAME ASSETS (3D)**

**COURSE OUTLINE**

- Study of props in 3d games
- Designing game props like Weapons, Vehicles, etc. according to requirement of the game.
- Study of Game Characters in 3D Games
- Developing Game Characters for different genres of 3D games.
- Rigging & adding controllers in game characters.
- Creating animation loops like walk, run, jump, attack, etc. based on the game requirement to be used in Unity. Baked 3D Animation.
- Moving assets by deformation
- Case study of assets, characters & animation of different genres of 3D Games.

**PRACTICAL SUBMISSION**

1. Develop own props for levels developed - 20 props
2. Develop characters for your own 3D Game.
3. Create animation loops for characters developed according to the requirement of the game.

**Suggested Reading**

1. Maya Studio Projects: Game Environments and Props by Michael McKrley
2. Game Character Development with Maya by Antony Ward

**PRACTICAL 3 – GAME ENGINE (3D)**

**COURSE OUTLINE**

- Introduction to Unity 3D
- Scripting – Scripts, Variables, Operators, Conditionals, Iteration, Methods, Input, Accessing Local Components, Accessing other objects
- Polish and Deploy – Managing Scenes, Persisting Data and Objects. Unity Player Settings, Building Your Game
- Real World Mechanic – Principles of Vectors, Defining 3D Space, Local and World Coordinate systems, Laws of Physics, Physics and the principle of Animation, 3D Tricks for Optimizing Game Space, Fog, Moving Textures, Blob Shadows
- Animation Mechanics – Sprites, Texture Atlas, Animated Sprites, Baked 3D Animation, Biomechanics, Single – Filed 3D Animation, Secondary Animation, Skinning & Matrix Palette Generation, Animation Blending, Post – Processing, Compression Techniques, Animation System Architecture, Animation Pipeline, Action State Machines, Animation Controllers
- Adding enemies & Projectiles to the 3D Game – Raycasting, Scripting reactive targets, Spawning enemy prefabs, basic AI
- Developing graphics for your game – Building basic 3D scenery, whiteboxing, texturing the scene with 2D images, generating sky visuals using texture images, working with custom 3D models, creating effects using particle systems
- Putting a 2D GUI in a 3D Game
- Creating third person 3D Game – player movement & Animation, adjusting the camera view for third person, implementing the jump action, setting up animations on the player character
- Adding interactive device and items within the game – Creating other devices, interacting with objects by bumping into them, managing inventory data and game state, inventory UI for using and equipping items

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- Collision and Rigid Body Dynamics – Collision Detection System, Rigid body Dynamics, Integrating a Physics Engine into your Game
- Types of maps, Screen Space & World Space, Adding the map, adding places of interest, Creating MapPoint prefabs for reuse, Updating Navigation Prompt Script, Updating Navigation Manager Script, Travelling by click or touch, Transitions, Updating Build settings to include new screens
- Shop – Building your Shop, Laying out your inventory, getting paid,
- Efficient RPG UI overlays, The battle state manager, Starting The battle, Selecting Weapons, GUI
- Levelling Up, Balancing, Preparing the battle manager script, beefing up the enemy, selecting a target, mixing up 2D & 3D, Particle effects, creating materials for particle effects.
- Building an action RPG, developing overarching game structure, controlling mission flow and multiple levels, completing a level by reaching the exit, loosing the level chord enemies, handling the players progression through the game
- Sound effects and Music – importing sound effects, playing sound effects, audio control interface, background music
- Events Systems, Exploring Randomness, Basic AI, State Machines, Sensors
- Building in game menu structures – the screens, The flow
- Working with settings – Using Player Prefs, Serializing your data

**PRACTICAL SUBMISSION**

1. Develop at least one of each element mentioned in the course outline on Unity.

**Suggested Reading**

1. Holistic Game Development with Unity: An All-in-One Guide to Implementing Game Mechanics, Art, Design and Programming by Penny de Byl
2. Game Engine Architecture 1st Edition by Jason Gregory (Author), Jeff Lander (Foreword), Matt Whiting (Foreword)

**PRACTICAL 4 – FINAL 3D GAME DESIGN PROJECT**

**COURSE OUTLINE**

- Creating Storyline & Storyboard for your own game.
- Develop 3D Characters, Environments, Levels & Assets
- Develop 3D Animation Sprites & Assets Sprite Sheets
- Import all to unity
- Create Rules & Logic
- Develop the entire functioning game in UNITY for different platforms
- Test the game for bugs & develop reports

**PRACTICAL SUBMISSION**

1. Following the procedure mentioned in course outline develop your own 3d game in unity for multiple platforms. Assets, levels & characters can be used from previous Practicals.
2. Create a trailer for the game developed
3. Do game testing of your own developed game in Final 3D Game Design Project
4. Submit the game with final reports

**Suggested Reading**

1. The Game Production Handbook by Heather Maxwell Chandler
2. The Ultimate Guide to Video Game Writing and Design by Flint Dille



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3. Holistic Game Development with Unity: An All-in-One Guide to Implementing Game Mechanics, Art, Design and Programming by Penny de Byl
4. Game Engine Architecture 1st Edition by Jason Gregory (Author), Jeff Lander (Foreword), Matt Whiting (Foreword)
5. Maya Studio Projects: Game Environments and Props by Michael McKinley
6. Game Character Development with Maya by Antony Ward

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