FIFTH SEMESTER

'GAMING
&
ANIMATION'
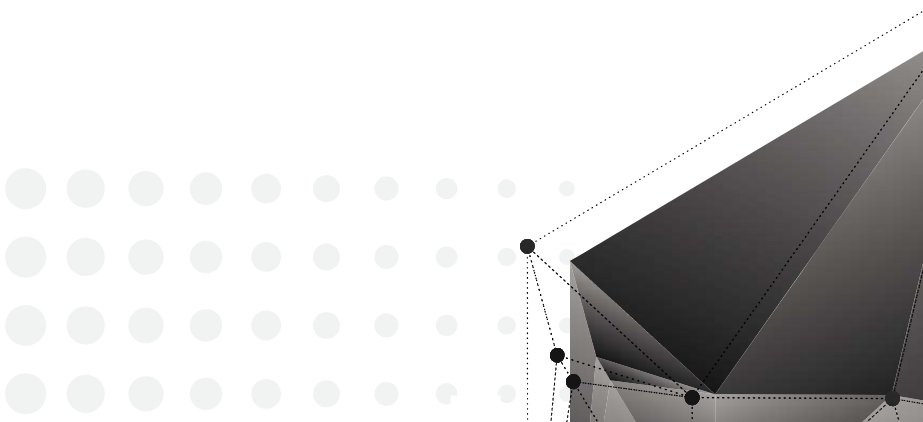
LEVEL DESIGN

Course Code:	505001
Course Title	Level Design
No. of Credits	6 (TH:6,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Understand the fundamental concepts and principles of level design in the context of gaming and animation, including its historical evolution and scope.

2. Identify and analyse the key elements of game levels, such as environmental design, lighting, sound, NPCs, puzzles, and objectives.

3. Apply level design principles to create visually appealing & well-balanced game levels, considering composition, player progression, difficulty balancing, flow, and narrative integration.

4. Utilize industry-standard level design software, asset creation tools, level editors, and scripting languages to design and implement game levels or animation sequences.

5. Apply knowledge of user experience and player psychology to create meaningful and engaging player experiences, incorporating player feedback and iterative design processes.

6. Collaborate effectively with interdisciplinary teams, including artists, programmers, and other team members, to communicate and coordinate level design ideas, manage feedback, and integrate changes.

COURSE CONTENTS

1. Introduction to Level Design:
- Definition & scope of level design in gaming & animation
- Historical overview of level design evolution
- Role of level designers in game development & animation production

2. Elements of Game Levels:
Environmental design: terrain, architecture, props, L i g h t i n g and atmosphere, Sound and music

3. Level Design Principles:
Composition & visual hierarchy, Player progression and pacing, Balancing difficulty and player engagement, Flow and navigation, Narrative integration

4. Tools and Software for Level Design:
Overview of industry-standard level design software (e.g., Unity, Unreal Engine), Introduction to asset creation and integration tools (e.g., 3D modeling software, texture editors), Level editors & scripting languages

5. User Experience and Player Psychology:
Understanding player motivations & behaviour, creating meaningful player experiences, player feedback & playtesting

6. Level Design Processes:
Concept ideation and brainstorming, Prototyping and iteration, Documentation and communication of design ideas, Level implementation and iteration in game engines

7. Emerging Trends and Future of Level Design:

- Impact of technological advancements (e.g., virtual reality, augmented reality)
- Procedural level generation
- Social and multiplayer level design considerations

Suggested Books:

1. "Level Up! The Guide to Great Video Game Design" by Scott Rogers
2. "The Art of Game Design: A Book of Lenses" by Jesse Schell
3. "Game Design Workshop: A Playcentric Approach to Creating Innovative Games" by Tracy Fullerton
4. "The Ultimate Guide to Video Game Writing and Design" by Flint Dille and John Zuur Platten
5. "The Game Level Design Handbook" by Casey L. Holtz
6. "Level Design: Processes and Experiences" by Christopher W. Totten
7. "Game Development Essentials: Game Level Design" by Jeannie Novak
8. "Theory of Fun for Game Design" by Raph Koster
9. "Level Design for Games: Creating Compelling Game Experiences" by Phil Co
10. "The Game Maker's Apprentice: Game Development for Beginners" by Jacob Habgood and Mark Overmars

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ART OF AUDIO EDITING

Course Code:	505002
Course Title	Art of Audio Editing
No. of Credits	6 (TH:6,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Understand the fundamental principles and techniques of audio editing in the context of gaming and animation.

2. Gain proficiency in using industry-standard audio editing software and tools.

3. Develop the ability to analyze and evaluate audio assets for gaming and animation projects.

4. Apply appropriate editing techniques to enhance the quality and impact of audio in gaming and animation.

5. Acquire knowledge of sound design principles and apply them to create immersive and engaging audio experiences.

6. Collaborate effectively with interdisciplinary teams, including game designers, animators, and programmers, to integrate audio elements seamlessly into gaming and animation projects.

COURSE CONTENTS

1. Introduction to Audio Editing

- Overview of audio editing in gaming and animation.
- Historical evolution and significance of audio in interactive media.
- Role of audio editors in game development and animation production.

2. Audio Editing Tools and Software

Introduction to industry-standard audio editing software, interface and basic functions of audio editing software, file formats and compatibility considerations.

3. Sound Editing Techniques

Audio file import/export and organization, basic editing operations (cutting, copying, pasting), audio manipulation (pitch shifting, time stretching, fading), noise reduction and audio restoration techniques.

4. Sound Design for Gaming and Animation

Role of sound in storytelling and creating atmosphere, sound effects creation and editing, foley artistry and recording techniques, dialogue editing and synchronization.

5. Mixing and Mastering

Introduction to audio mixing principles and techniques, balancing audio elements (sound effects, music, dialogue), applying effects and filters, mastering audio for optimal quality & compatibility.

Suggested Books:

1. "The Game Audio Tutorial: A Practical Guide to Sound and Music for Interactive Games" by Richard Stevens and Dave Raybould
2. "Audio Postproduction for Film and Video" by Jay Rose
3. "The Complete Guide to Game Audio: For Composers, Musicians, Sound Designers, Game Developers" by Aaron Marks
4. "Game Audio Implementation: A Practical Guide Using the Unreal Engine" by Richard Stevens
5. "Mixing Audio: Concepts, Practices, and Tools" by Roey Izhaki
6. "The Foley Grail: The Art of Performing Sound for Film, Games, and Animation" by Vanessa Theme Ament

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VFX LAB (ADVANCED)

Course Code:	505003
Course Title	VFX Lab (Advanced)
No. of Credits	4 (TH:0,T:0,P:8)

PRACTICALS OUTCOMES: At the end of the course, the student will be able to:

1. Proficiency in advanced compositing techniques, including deep compositing, advanced keying, and photorealistic integration of CG elements.

2. Mastery of advanced motion tracking techniques such as planar tracking, object tracking, camera tracking, and match moving with 3D elements.

3. Ability to create advanced particle systems and simulations for effects like fire, smoke, fluids, cloth, hair, and rigid body dynamics.

4. Expertise in advanced 3D integration and camera projection, including modeling, texturing, lighting, shading, rendering, and compositing with 3D passes.

5. Proficiency in advanced visual effects techniques like rotoscoping, green screen compositing, wire and rig removal, crowd simulation, and VR / AR effects.

6. Demonstration of creative and technical mastery by designing and executing an advanced VFX shot/sequence showcasing multiple advanced techniques.

LIST OF PRACTICALS:

1. Advanced Compositing Techniques:
- Deep compositing using software.
- Advanced keying and matte extraction techniques.
- Advanced colour grading and matching methods.

2. Advanced Motion Tracking:
- Performing planar tracking and corner pinning for accurate object tracking.
- Object tracking and rig removal techniques.
- Camera tracking and stabilization methods.

3. Advanced Particle Systems and Simulation:
- Creating advanced particle effects such as fire, smoke, and explosions.
- Simulating fluid and liquid behaviour.

4. Advanced 3D Integration and Camera Projection:
- Utilizing advanced 3D modeling and texturing techniques.
- Applying advanced lighting and shading principles to enhance realism.

5. Advanced Visual Effects Techniques:
- Advanced rotoscoping and rotomation techniques for precise object isolation and animation.

Reference Books:

1. "The Art and Science of Digital Compositing" by Ron Brinkmann
2. "The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures" by Jeffrey A. Okun and Susan Zwerman
3. "The Invisible Art: The Legends of Movie Matte Painting" by Mark Cotta Vaz and Craig Barron
4. "Digital Compositing for Film and Video" by Steve Wright
5. "Matchmoving: The Invisible Art of Camera Tracking" by Tim Dobbert
6. "Fluid Simulation for Computer Graphics" by Robert Bridson
7. "The Visual Effects Producer: Understanding the Art and Business of VFX" by Charles Finance and Susan Zwerman.

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GAME DEVELOPMENT LAB (BUILDBOX)

Course Code:	505004
Course Title	Game Development Lab (Buildbox)
No. of Credits	4 (TH:0,T:0,P:8)

PRACTICALS OUTCOMES: At the end of the course, the student will be able to:

1. Ability to design and develop 2D games using Buildbox software.

2. Proficiency in creating game mechanics, levels, and interactive gameplay elements.

3. Understanding of game asset creation and integration into Buildbox projects.

4. Knowledge of implementing user interfaces, menus, and game controls.

5. Proficiency in testing, debugging, and optimizing games for performance.

6. Demonstration of creativity and problem-solving skills through the development of original game projects.

LIST OF PRACTICALS:

1. Study of buildbox software interface and features & game development workflow.

2. Designing and implementing game mechanics such as player movement, collision detection, and scoring systems.

3. Creating or importing 2D game assets like characters, objects, and backgrounds into Buildbox projects.

4. Designing intuitive user interfaces and menus for game navigation.

5. Testing of games to identify and fix bugs and gameplay issues.

Suggested Books:

1. "Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#" by Jeremy Gibson Bond

2. "Buildbox 2.x Game Development" by Ty Audronis

3. "Unity in Action: Multiplatform Game Development in C#" by Joe Hocking

4. "Game Programming Patterns" by Robert Nystrom

5. "Level Up! The Guide to Great Video Game Design" by Scott Rogers

6. "The Art of Game Design: A Book of Lenses" by Jesse Schell

7. "The Animator's Survival Kit" by Richard Williams

8. "Character Animation Crash Course!" by Eric Goldberg

9. "The Game Audio Tutorial: A Practical Guide to Sound and Music for Interactive Games" by Richard Stevens and Dave Raybould

10. "The Ultimate Guide to Video Game Writing and Design" by Flint Dille and John Zuur Platten

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3D TEXTURING AND LIGHTING (MAYA, BLENDER, 3DS MAX)

Course Code:	505005
Course Title	3D Texturing and Lighting (Maya, Blender, 3DS Max)
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Develop a comprehensive understanding of the principles and techniques of 3D texturing and lighting.

2. Gain proficiency in using industry-standard software such as Maya, Blender, and 3Ds Max for creating realistic textures and lighting setups.

3. Acquire practical skills in creating textures and materials for various objects and environments.

4. Learn to effectively use different types of lighting sources and techniques to enhance the visual appeal of 3D scenes.

5. Understand the workflow and best practices for optimizing textures and lighting setups for real-time applications, such as games and simulations.

6. Develop the ability to critically analyze and evaluate the quality of textures and lighting in 3D scenes.

7. Apply creative thinking and problem-solving skills to overcome challenges in texturing and lighting.

COURSE CONTENTS

1. Introduction to 3D Texturing and Lighting

Importance of texturing & lighting in 3D graphics, different types of textures & their applications, lighting in 3D environments.

2. Texture Creation Techniques

UV mapping and unwrapping, texture painting and digital painting techniques, procedural texturing using noise, patterns and shaders, creating realistic materials and textures for objects and environments.

3. Advanced Texture Mapping

Texture projection techniques (planar, cylindrical, spherical), texture blending and layering, normal mapping and bump mapping, displacement mapping for adding fine details.

4. Lighting Techniques

Types of light sources (point, directional, spot, area), light properties (intensity, color, attenuation, shadows), Global Illumination techniques (radiosity, ray tracing, ambient occlusion), HDR (High Dynamic Range) lighting.

5. Advanced Lighting Setups

Three-point lighting and other traditional lighting setups, image-based lighting and HDRI (High Dynamic Range Imaging), studio lighting techniques.

6. Real-Time Lighting and Optimization

Optimizing textures and lighting for real-time applications, light mapping techniques for real-time engines

Suggested Books:

1. "Digital Texturing and Painting" by Owen Demers

2. "Lighting for Animation: The Art of Visual Storytelling" by Jasmine Katatikarn and Michael Tanzillo

3. "The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures" by Susan Zwerman

4. "Texturing and Modeling: A Procedural Approach" by David S. Ebert et al.

5. "Realistic Architectural Visualization with 3ds Max and mental ray" by Roger Cusson and Jamie Cardoso

6. "Blender 3D: Architecture, Buildings, and Scenery" by Allan Brito

7. "Maya Studio Projects: Texturing and Lighting" by Lee Lanier

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'Elective 1-1'
DRAWING TECHNIQUE & SKETCHING

Course Code:	505006
Course Title	Drawing Technique & Sketching
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Understanding the basic principles of drawing, including shapes, lines, forms, and proportions & how they can be used to create compelling compositions.

2. Gaining proficiency in drawing materials and tools, including pencils, charcoal, ink, markers, and erasers, and understanding their unique properties and uses.

3. Developing a range of techniques for drawing and sketching, including shading, hatching, cross-hatching, stippling, and blending.

4. Mastering the principles of perspective drawing, including one-point, two-point, and three-point perspective, to create the illusion of depth and space in drawings.

5. Understanding the principles of composition and layout, including the rule of thirds, symmetry, and balance, and applying them in drawings and sketches.

6. Developing the ability to sketch from observation, including still-life objects, nature, and human figures, and capturing their essential qualities.

COURSE CONTENTS

1. **Basics of drawing:** Shapes, lines, forms & proportions.

2. **Techniques of drawing and sketching:** Shading, hatching, cross-hatching, stippling & blending.

3. **Perspective drawing:** One-point, two-point, and three-point perspective.

4. **Composition and layout:** Rule of thirds, symmetry & balance.

5. **Sketching from observation:** Still-life objects, nature, and human figures.

6. **Gesture drawing:** Capturing the essence and movement of the subject.

7. **Portraiture:** Facial features, expressions & proportions.

8. **Anatomy:** Human and animal anatomy for figure drawing.

9. **Digital drawing and sketching:** Basics of digital tools such as tablets and software programs for digital sketching.

Note :- Drawing Techniques and Sketching is a subject that focuses on developing the technical skills required for creating visual art through drawing.

Suggested Books:

1. "The Skillful Huntsman: Visual Development of a Grimm Tale at Art Center College of Design" by Scott Robertson, Khang Le, and Mike Yamada.

2. "How to Draw: Drawing and Sketching Objects and Environments from Your Imagination" by Scott Robertson.

3. "Framed Ink: Drawing and Composition for Visual Storytellers" by Marcos Mateu-Mestre

4. "The Animator's Sketchbook" by Tony White

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'Elective 1-2'
LIFE DRAWING & CHARACTER DESIGN

Course Code:	505007
Course Title	Life Drawing & Character Design
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Understanding of human anatomy and proportion, including bone structure, muscles & body proportions.

2. Ability to use gesture drawing and quick sketch techniques to capture the essence of the human body and its movements.

3. Proficiency in using reference materials, such as photographs and live models, to inform and improve character design.

4. Ability to design original characters, including concept development, character traits, and costume and accessory design.

5. Proficiency in using 2D and 3D character modelling software to create, texture and shade characters as well as basic rigging and animation principles for character movement and final rendering and presentation techniques.

COURSE CONTENTS

Basic anatomy and proportion of the human body

1. Gesture drawing and quick sketch techniques
2. Using reference materials, such as photographs and live models
3. Drawing the head and face, including expressions and emotions
4. Designing original characters, including concept development and character traits
5. Costume and accessory design
6. 2D and 3D character modeling software, such as Maya and Zbrush
7. Texturing and shading techniques
8. Basic rigging and animation principles
9. Final rendering and presentation techniques.

Note :- Life Drawing and Character Design is a subject that focuses on the art of drawing human figures and creating original characters.

Suggested Books:

1. "Figure Drawing for All It's Worth" by Andrew Loomis

2. "Force: Dynamic Life Drawing for Animators" by Mike Mattesi

3. "Anatomy for the Artist" by Sarah Simblet and John Davis

4. "The Artist's Complete Guide to Figure Drawing: A Contemporary Perspective On the Classical Tradition" by Anthony Ryder

5. "Character Design Quarterly: Visual Development | Illustration | Concept Art" by 3dtotal Publishing

6. "The Animator's Survival Kit" by Richard Williams

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'Open Elective 1-1'
INTERNET OF THINGS

Course Code:	435002
Course Title	Internet of Things
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES: By the end of this course, students will be able to:

1. Understand the fundamental concepts and principles of the Internet of Things (IoT) and its applications.

2. Design and develop IoT architectures, considering scalability, security, and interoperability.

3. Implement IoT solutions using relevant hardware platforms, software frameworks, and programming languages.

4. Apply data collection and analytics techniques to extract insights from IoT systems.

5. Analyze and evaluate the challenges and ethical considerations related to privacy, security, and data governance in IoT deployments.

6. Explore emerging trends and applications of IoT, such as smart cities, industrial IoT, healthcare & agriculture.

COURSE CONTENTS

Unit 1:

1.1 Introduction to IoT

1.2 Sensing elements

1.3 Actuation methods

Unit - 2 :

2.1 Basics of IoT Networking

2.2 Communication Protocols

2.3 Sensor networks

Unit - 3 :

3.1 Introduction to Basic Arduino programming

3.2 Integration of Sensors/Actuators to Arduino

Unit - 4 :

4.1 Implementation of IoT with Raspberry Pi (Overview Only)

4.2 Data Handling Analytics

Unit - 5 :

5.1 Case Studies of IoT applications (any one example) in the filed of :

    5.1.1 Agriculture

    5.1.2 Healthcare

    5.1.3 Activity Monitoring

References:

1. "Internet of Things (A Hands-on Approach)" by Arshdeep Bahga and Vijay Madisetti.

2. "IoT Solutions in Microsoft's Azure IoT Suite" by Scott Klein and Paolo Patierno.

3. "Raspberry Pi IoT Projects: Prototyping Experiments for Makers" by John C. Shovic and Jeff Chang.

4. "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things" by David Hanes and Gonzalo Salgueiro.

5. "Practical Internet of Things with MQTT and RabbitMQ" by Anand Vemuri.

6. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22

7. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)

8. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)

9. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

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'Open Elective 1-2'
MULTIMEDIA TECHNOLOGIES

Course Code:	435006
Course Title	Multimedia Technologies
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES : At the end of the course, the student will be able to:

1. Understand the foundation and concepts of multimedia, including hardware, software, operating systems, and communication systems.

2. Apply compression techniques to reduce the file size of multimedia content while maintaining acceptable quality.

3. Utilize desktop publishing tools and software to create visually appealing multimedia content.

4. Create multimedia animations and special effects using 2D and 3D animation techniques.

5. Apply digital imaging techniques within the context of multimedia production to enhance visual elements.

6. Develop multimedia applications using programming languages and frameworks to create interactive and engaging multimedia experiences.

COURSE CONTENTS

Unit - 1 : Introduction to Multimedia

Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software, Multimedia operating systems, Multimedia communication system

Unit - 2 : Basic Compression Techniques Video and Audio Data Compression Techniques –

Lossy and Lossless. Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265

Unit - 3 : Content Development and Distribution (Basic Idea Only)

Desktop publishing Software (Coral Draw, Photoshop, Page maker) Multimedia Animation & Special effects (2D/3D animation, Flash)

Unit - 4 : Introduction to Digital Imaging

Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia

Unit - 5 : Introduction to Multimedia Programming and Applications

Note :- The faculty is advised to give the basic idea of any one of the following softwares: Coral Draw, Photoshop or Page maker.

Reference Books:

1. An Introduction to Multimedia Authoring, A. Eliens

2. Fundamentals of Multimedia, Prentice Hall/Pearson, Ze-Nian Li & Mark S. Drew.

3. Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018

4. Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

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SUMMER INTERNSHIP-II

Course Code:	AS501
Course Title	Summer Internship - II
No. of Credits	3 (TH:0,T:0,P:0)

Summer Internship provides an invaluable opportunity for students pursuing their Diploma in Engineering to gain real-world experience and exposure to various industrial production units and commercial activities related to their field of study. This program aims to bridge the gap between theoretical knowledge and practical application, equipping students with the necessary skills and expertise to thrive in the branch related industry.

At the end of the **Fourth semester,** students will undertake a minimum **6-week** Summer Internship, scheduled during the semester break following the Fourth Semester examinations. The respective Heads of Departments (HoDs) and experienced faculty members will guide and assist students in securing suitable training opportunities that align with their specialization. Each student will have a personalized training schedule developed in collaboration with the training providers, ensuring a comprehensive and enriching learning experience.

Before starting their training, students will receive a comprehensive briefing about the organizational setup, product range, manufacturing processes, and significant machinery and materials used in the training organization. This preliminary understanding will enhance their engagement and productivity during the internship.

To ensure a fruitful learning experience, faculty members will supervise students during their training in the industry or field organization. Each teacher will mentor a small group of 4-5 students, providing personalized attention and guidance. Students will be encouraged to maintain daily reports in their diaries, which will assist them in composing their final training report and presentation.

The evaluation process for the Summer Internship will include both internal and external assessments, as per the study and evaluation scheme of the **Fifth Semester.** During the viva-voce/presentation examination, students' understanding of materials, industrial processes, practices in the industry, and problem-solving abilities will be assessed. The evaluation will also focus on their application of knowledge and skills in real-life situations.

The components of evaluation will comprise:
(a) Punctuality and regularity: 15%
(b) Initiative in learning new things: 15%
(c) Relationship with peers and colleagues: 10%
(d) Summer Internship report: 25%
(e) Viva-Voce: 35%

We believe that this Summer Internship program will be a transformative experience for our students, empowering them to excel in their future careers and make meaningful contributions to the Engineering industry. The collaborative efforts of our experienced faculty members and industry partners will ensure that students gain valuable insights and practical skills during this immersive learning journey.

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MAJOR PROJECT-I

Course Code:	AS502
Course Title	Major Project - I
No. of Credits	1 (TH:0,T:0,P:2)

The evaluation of Major Project-I will be conducted to assess students' understanding, application, and presentation of their chosen project topic. The following evaluation criteria will be used to measure their performance:

1. **Project Identification (10%):**
   - Clarity and relevance of the chosen project topic.
   - Demonstration of understanding of the industry or community needs addressed by the project.
   - Adequate justification for selecting the particular project topic.

2. **Project Proposal (10%):**
   - Comprehensive description of project objectives and scope.
   - Logical and well-structured methodology for project execution.
   - Feasibility of the proposed project, considering available resources.

3. **Literature Review (10%):**
   - Thoroughness of the research conducted in relevant academic and professional sources.
   - Critical analysis of existing literature, identifying gaps and potential contributions of the project.

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4. **Feasibility Study (10%):**
   - Evaluation of the project's practicality and viability.
   - Assessment of potential risks and proposed mitigation strategies.

5. **Project Planning (20%):**
   - Detailed project plan, including timeline, milestones, and resource allocation.
   - Realistic budgeting and cost management strategies.

6. **Proposal Presentation (30%):**
   - Clarity and effectiveness of communication during the presentation.
   - Ability to address questions and defend the project proposal confidently.
   - Professionalism and engagement with the panel and audience.

7. **Overall Impression (10%):**
   - Demonstrated commitment and effort throughout the project.
   - Creativity and innovation in problem-solving.
   - Adherence to project management principles and best practices.

Note :- For students in their final Year (Fifth Semester) of Gaming and Animation Curriculum, here are some suggestions for major projects:

1. Web-Based Interactive Game: Develop a web-based game using advanced web technologies. Incorporate

interactive gameplay mechanics, engaging storytelling, and immersive visuals to create an enjoyable gaming experience.

2. Virtual Reality Experience: Create a virtual reality experience that showcases the potential of VR technology. Design and develop an immersive environment with interactive elements, realistic physics, and captivating visuals to provide users with an engaging and memorable VR experience.

3. Multiplayer Online Game: Design and develop a multiplayer online game using Unity 3D. Implement networking functionalities to enable players to compete or cooperate in a shared virtual game world, providing a dynamic and social gaming experience.

4. 3D Character Animation Short Film: Produce a 3D character animation short film using rigging and animation techniques. Develop an engaging story, expressive characters, and high-quality animation to create a visually appealing and emotionally impactful short film.

5. Augmented Reality Application: Create an augmented reality (AR) application that combines virtual elements with the real world. Develop an AR experience that enhances user interactions, provides useful information, or creates interactive entertainment using AR technologies.

6. Game Development for Mobile Platforms: Develop a mobile game using Unity 3D or other game development tools. Optimize the game for mobile platforms, considering touch controls, performance, and user experience, and publish it on app stores to reach a wide audience.

7. 3D Visualization and Simulation: Create a 3D visualization or simulation project using software like Maya, Max, or Blender. Develop a realistic environment or scenario to simulate real-world conditions, allowing users to interact and explore the virtual environment.

8. Interactive VR Training Application: Design and develop an interactive VR training application for a specific industry or skill. Use VR technology to provide a realistic and immersive training experience, allowing users to practice and learn in a safe virtual environment.

9. Web-Based Portfolio Showcase: Create a web-based portfolio showcase that highlights the skills and projects completed during the diploma program. Design an aesthetically pleasing and user-friendly website to showcase 3D models, animations, games, or web projects.

10. Innovative Game or Application Concept: Develop an innovative game or application concept that leverages advanced technologies, such as AI, machine learning, or blockchain. Create a proof-of-concept prototype that demonstrates the unique features and potential of the concept.

These project suggestions allow students to apply their knowledge and skills acquired throughout the curriculum, demonstrate their creativity and technical expertise, and showcase their abilities to potential employers or clients. The projects should be chosen based on individual interests, goals, and the availability of resources and expertise within the institution or program.

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